



Symposium on IPM and Water Quality Yields Exciting New Ideas for Collaboration in the West

By Diane Clarke



Tim Waters, Washington State University Extension

During the afternoon session, symposium participants brainstormed about strategies for collaboration among IPM and Water Quality researchers, educators, and other stakeholders in the Western Region.

An enthusiastic and fruitful discussion among participants at a recent Western IPM Center cosponsored symposium—“Investigating the Connections between IPM and Water Quality,” held on April 13 at the Pacific Branch Entomological Society of America’s Annual Meeting, in Boise, Idaho—yielded specific ideas for collaboration and catalyzed formation of a core group to seek funding for a region-wide IPM and Water Quality research, education, and extension group in the West.

This outcome met the chief goal of the one-day symposium, which was to create a forum for IPM and water quality researchers and educators in the Western Region to explore possible collaborations and ways of funding them. To that end, the symposium’s morning hours were devoted to speakers on current topics and research projects related to IPM and water quality in the West, and the shorter afternoon session was set aside for brainstorming.

Planning and organization of the symposium were spearheaded by Ronda Hirnyck, Extension Pesticide Coordinator, University of Idaho—Boise Center; Linda Herbst, Associate Director of the Western IPM Center (WIPMC); and Bob Mahler, Professor of Soil Fertility and coordinator of the Water Quality Program for the College of Agricultural and Life Sciences at the University of Idaho. The meeting was moderated by Rick Melnicoe, WIPMC Director, and Linda Herbst.

During the last few years, researchers and educators in the National Institute of Food and Agriculture’s regional Water Quality and IPM programs in the West have been seeking ways to intersect and develop synergies. The Boise symposium built on and furthered discussions begun in 2008 at NIFA’s National Water Conference, in Sparks, Nevada, in a session entitled, “Improving Water Quality through Integrated Pest Management: Working Together.”

Morning Session: Speakers

Issues and research topics addressed during the symposium’s morning hours ranged from

the effect of pesticides on aquatic ecosystems to the social science behind water quality programming.

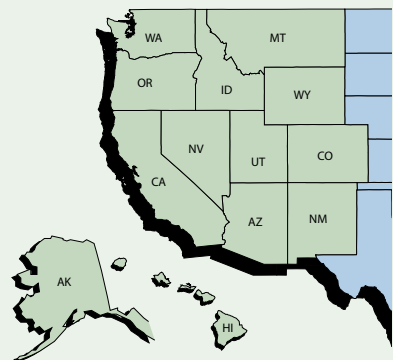
Lead speaker **Bob Nowierski**, USDA-NIFA, offered a history of IPM in the United States and highlighted national IPM programs, including those with impacts on water quality, such as the Web-based national warning system known as *ipmPIPE* (IPM Pesticide Information Platform for Extension and Education). *ipmPIPE* began shortly after Asian soybean rust was found in the United States and has prevented unnecessary pesticide applications in areas where the system indicates there is no danger of soybean rust, with positive implications for water quality.

John Stark, professor in the Ecotoxicology Program at Washington State University, Puyallup, and director of the WSU Salmon Toxicology Research Laboratory, said even though IPM has been implemented in many crop systems, pesticides are still entering surface waters in the United States. They are usually found in low concentrations, but as mixtures, in almost every surface water system in the country. There is much that is not known about the effects of pesticides in aquatic ecosystems. Unknowns include types and amounts of pesticides in our waters, multiple sublethal effects, and the effects of

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Center Scope

The Western IPM Center enhances communication between federal and state IPM programs in the western United States: Alaska, Arizona, California, Colorado, Hawaii and the Pacific territories, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. It serves as an IPM information network, designed to quickly respond to information needs of the public and private sectors.



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Director's Comments

We are facing some challenging times for the Regional IPM Centers. In his 2011 budget, proposed in February, President Obama eliminated all of the Section 406 Integrated Activities from the USDA budget. The \$45.148 million in Section 406 is proposed to be moved into NIFA's Agriculture and Food Research Initiative (AFRI) Competitive Grants Program. This is not a new idea; however, past attempts included language that moved the 406 programs intact. Federal funds have clear and strict restrictions about use for lobbying. Therefore, we have been careful to stay within these restrictions in providing information to our clientele and supporters. We have pointed people to our Web site, which has information on our programs and successes. As of this writing we have heard of much support and are hopeful that these unique Centers will continue beyond 2011.

The real strength of the Western IPM Center lies in the network of state IPM Coordinators, researchers and extension staff, Project Directors of our funded projects, and many others who provide information, IPM needs, and much more. We have developed an extraordinarily strong community, dedicated to the best pest management possible. Our agricultural partners have always been strong. In recent years, we have added the urban component to our team. We have school IPM growing in leaps and bounds. We have seen a structural IPM training center developed at Washington State University. We have numerous Work Groups dealing with specific issues. Most recently, after a year of planning, we developed a joint symposium with regional Water Quality personnel. The outcome is a commitment to work together to form a regional committee dedicated to IPM and Water Quality (see separate article). These and many, many other projects would not have been possible without a central coordinating entity. The Western IPM Center has been this entity, helping to bring people together for the good of IPM.

The Pest Management Alternatives Program (PMAP) recently completed reviews of applications submitted. This program is evolving and issued a national RFA without regional priorities this winter. Regional relevancy was determined by panels in the four regions reviewing the relevancy statements of proposals submitted from the

respective regions. I participated in the technical meeting and presented relevancy evaluations for western proposals. My counterparts in the other regions did likewise. The process of combining technical reviews and relevancy reviews is, on the surface, a simple matter. In reality, it is much more difficult. After the dust settled, I was reasonably happy with the outcome and feel that the projects recommended for funding were the best of the applications. We did come to a consensus that the relevancy component will be conducted by the technical panel in future years. Nearly every other program (Regional IPM Grants being the most notable exception) does not have a separate relevancy component. Technical scoring includes an evaluation of the relevancy, and I am confident that a well-run technical panel can assess whether or not the applicant has made a good argument for the importance of the proposal to stakeholders.

The Western IPM Center's next RFA will be released in early July and will include funding for Work Groups, Outreach and Education, and Surveys. This RFA will only support one-year projects, as it is the final year of support that we will receive for competitive grants under our four-year Western IPM Center grant.

The Regional IPM Centers and several scientists from the West have been participating in Housing and Urban Development (HUD)-funded IPM training. This training of superintendents of public housing has taken place in several locations nationally. In the West, training has occurred or will occur in San Francisco, Guam, and Hawaii. Look for a detailed report in a future issue of the Western Front.

Dr. Sheryl Kunickis was appointed as Director of the USDA Office of Pest Management Policy (OPMP), an office housed within the Agricultural Research Service (ARS). OPMP advises and represents USDA's policy matters specifically related to pesticide regulation and pest management. Dr. Kunickis has most recently served as Director and Program Manager of the USDA Natural Resources Conservation Service (NRCS) in Beltsville, Maryland. Previous to this position, she served the NRCS for more than 21 years as Research Coordinator, Program Manager, Laboratory Director, Soil Scientist, and Landscape Analyst.

—Rick Melnicoe

More than \$11.8 Million Leveraged from Western IPM Center Grants

Western IPM Center competitive grants have been funding IPM projects throughout the Western Region since 2004. In many cases, these projects produced data and results that were used later in garnering additional funding from other sources, thus multiplying the effectiveness of the original grant amount. This additional funding has been used in the advancement of IPM in production agriculture; residential, urban, and institutional settings; research and extension programs; natural resource and wildland spaces; and public areas throughout the United States. Western IPM Center funding has resulted in at least \$11.8 million in leveraged funds, representing more than a \$2 return for each \$1 awarded.

Pest Management Strategic Plans (PMSPs) and Crop Profiles

PMSPs and Crop Profiles funded by the WIPMC have yielded more than **\$2 million** in leveraged funding through WIPMC's Addressing Western IPM Issues program, the Oregon Raspberry and Blackberry Commission, and the USDA-National Institute of Food and Agriculture (USDA-NIFA) Crops at Risk program and Regional IPM Program (Western Region).

Work Groups

Leveraged funds resulting from WIPMC-funded work groups have totaled more than **\$8.6 million** via the Western Sustainable Agriculture Research and Education program (WSARE), the Southwest

Consortium on Plant Genetics and Water Resources, the National Plant Diagnostic Network (NPDN), USEPA's Pesticide Registration Improvement Renewal Act (PRIA 2) program and Pesticide Environmental Stewardship Program, USDA's National Resources Conservation Service, the Oregon Association of Nurseries, the Oregon Department of Agriculture, WIPMC's Addressing Western IPM Issues program, and USDA-NIFA's Specialty Crop Research Initiative program, National Extension Integrated Pest Management Special Projects program, Agriculture and Food Research Initiative program, Regional IPM Program (Western Region), Risk Avoidance and Mitigation Program, and Specialty Crop Research Initiatives program.

Addressing Western IPM Issues

Funding in this grants program has leveraged more than **\$480,000** through the California Department of Pesticide Regulation's Pest Management Alliance program, USDA-NIFA's Critical Issues: Emerging and New Plant and Animal Pests and Diseases program, and the WSARE Research and Education program.

Special Projects

WIPMC funding in the Special Projects grants program has leveraged more than **\$580,000** through USEPA Region 10, the Washington Specialty Crop Block Grant program, WIPMC's Addressing Western IPM Issues program, and USDA-NIFA's Regional IPM Program (Western Region).

mixtures, inert ingredients, and breakdown products. It is known that adjuvants coat the gills of fish, and some adjuvants are xenoestrogens (industrially made compounds with estrogenic effects), causing disruption in the reproductive processes of some species. Pesticide mixtures in water are coming primarily from urban and suburban areas. Stark cited several case studies from his research. In one, binary pesticide mixtures had synergistic rather than additive effects.

Parry Klassen, Executive Director of the Coalition for Urban/Rural Environmental Stewardship (CURES) and Board Chairman of the East San Joaquin Water Quality Coalition (ESJWQC), highlighted outcomes of the ESJWQC's approach to addressing pesticide-related water quality issues. This approach involves using geographic information system (GIS) and pesticide use data to identify specific growers and landowners for one-on-one visits to discuss a site's pest management practices and how they might be improved to decrease negative impacts on water quality.

The ESJWQC, a voluntary organization comprised of agricultural interests and growers representing many "dischargers" who own or operate irrigated lands in six counties east of the San Joaquin River, has built a GIS database of all landowners and farms in the Coalition coverage area. In addition to the one-on-one visits, the Coalition sends targeted mailings and notices for local workshops to properties adjacent to or in close proximity to each waterway sampled by the Coalition. These workshops cover best management practices (BMPs) to solve water quality problems.

In 2008, the Coalition selected three problem waterways in Stanislaus and Merced Counties as top priorities for improved management plans. Using the GIS database, the Coalition identified all parcels owned by coalition members bordering these three priority waterways and then used pesticide use information to contact the growers who were using the pesticides found in the sample sites. In winter and spring 2009, Coalition staff met with the member property owners/operators one-on-one to discuss practices used on the fields and additional practices that could be implemented. Recommended BMPs differed from farm to farm, since each watershed is unique and each farm has a different set of variables.

After the mapping and the one-on-one visits, sampling for pesticides from February through September 2009 in the three priority watersheds found no exceedances sourced to Coalition members. When growers were asked about the Coalition's approach (mapping and grower visits to talk about BMPs), 100% said this is the way to do it.

The ESJWQC plans to follow up with members in the three waterways, document practice changes on a watershed-wide basis, and then continue using this process with the

next set of priority waterways in the Coalition area.

Philip Janney, Ph.D. student, Oregon State University (OSU), shared results of a study he collaborated on that tested the effectiveness of riparian vegetation as a drift barrier between cherry orchards and surface water at two sites in Oregon. Principal investigator for the study was Jeffrey Jenkins, Professor and Extension Specialist, OSU, and additional collaborators included Kelly Wallis, faculty research assistant, and Helmut Riedl, Professor Emeritus, both of OSU. The study was designed to be an outreach tool to growers.

Filter paper samplers were set up at five locations along two transects extending from within the cherry orchards toward nearby streams. One of the transects had riparian vegetation between the orchard and the waterway. Wind speed and direction were monitored, and aerial and ground applications of malathion were made. After analyzing the sampler residue readings, the group developed exposure scenarios for each location. Areas without riparian vegetation resulted in higher estimates of pesticide load in the streams. The group then characterized the risk to aquatic organisms for each site. The study demonstrated that riparian vegetation would reduce the amount of pesticide that would reach the streams and therefore reduce the risk to aquatic life.

Ginger Paige, Assistant Professor, Department of Renewable Resources, University of Wyoming, Laramie, spoke about her development of a guidance document for designing water quality monitoring programs that successfully demonstrate the effectiveness of BMPs implemented to reduce nonpoint source pollution in stream systems. Paige developed the document in collaboration with Nancy Mesner and Andree Walker, Utah State University, and their target audience includes state environmental agencies, conservation groups, land management agencies, and volunteer monitoring groups. There is an increasing call for these groups to be able to demonstrate that practices designed to benefit water quality have, in fact, reduced pollutants and resulted in cleaner water. Poorly designed monitoring programs have made it difficult to demonstrate these impacts.

The most common problems are failure to design monitoring plans around BMP objectives; failure to understand the pathways of pollutants, how pollutants can be transformed in those pathways, and the sources of variability in these dynamic systems; and the tendency to draw upon a limited set of approaches, or to use inappropriate approaches. The guidance document seeks to help people get away from a "one-size-fits-all" approach to monitoring design so that monitoring results can more effectively and reliably demonstrate the impacts of BMPs meant to reduce pollutants. It is not a "how to" document but rather covers the considerations and decisions



Robin Rosetta, Oregon State University, and Bob Mahler, University of Idaho, participating in the afternoon session.

necessary as a monitoring project is first being planned.

Ginger and her colleagues have also developed a checklist and decision tree to aid those developing monitoring designs. These and the guidance document will be available on a dedicated Web site that is under development.

Frank Zalom, Professor, University of California, Davis, discussed research on the effects of changing pest and site management practices in California almond production to reduce off-site movement of pesticides. One source of pesticides in surface water in the Sacramento and San Joaquin watersheds is stormwater runoff from agricultural lands. After monitoring began in 1988, organophosphate (OP) insecticides, especially diazinon and chlorpyrifos, were routinely detected in these watersheds coincident with storm events that followed their application to dormant orchards. In 1998, the State of California placed the Sacramento and San Joaquin Rivers and the associated delta/estuary on the Clean Water Act 303(d) list of impaired waterways, in part because of elevated levels of diazinon and chlorpyrifos from dormant spray orchard runoff. Dormant orchard sprays for almonds, stone fruit, and some pome fruit were widely adopted in the 1980s because of their many advantages over in-season sprays of OPs (e.g., pest life stages are synchronized, single spray is easier and cheaper, no food residues, etc.).

Research and extension efforts on dormant spray alternatives and mitigation practices began in 1990. The goal of Zalom's work was to promote the reduction of offsite movement of harmful pesticides by promoting alternative site management and alternative pest management practices. Alternative site management practices included earlier treatment timing (when soils are more conducive to infiltration and before the rainy season when runoff is more likely); orchard floor management

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Rebecca Sisco

Western Region Field Coordinator, IR-4

Since 2003, when Rebecca (Becky) Sisco began serving on the Western IPM Center's Advisory Committee, the Center has benefited from her unique regional perspective as the Western Region Field Coordinator for the IR-4 Project (Interregional Research Project Number 4). WIPMC Associate Director Linda Herbst said, "Becky really brings the strength of a regional focus with her broad knowledge of pesticides and pest management issues in the West." This expertise has also made her a valuable voice on grant review panels, including for the Regional Integrated Pest Management (RIPM) Competitive Grants Program and the Pest Management Alternatives Program (PMAP). In addition, Becky has enhanced the WIPMC's relationship with the national IR-4 program and other national programs. For her part, Becky said of WIPMC Director Rick Melnicoe, "He is always a wealth of knowledge about who to go to for certain information. I appreciate their availability to assist us in our work because of who they know and what they know is going on." Linda added, "It's a great reciprocal relationship," noting that Rick has reviewed Western Region IR-4 biopesticide grant program applications.

Becky came to the IR-4 program in June 2001 after 20 years in the crop protection industry. She has worked developing insect resistant corn lines, conducting residue field trials, managing the field residue program for a major registrant company, and conducting work specific to the registration, reregistration, and evaluation of products under European Regulatory Guidelines as well as FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and the FQPA (Food Quality Protection Act), including the development of risk assessments in the areas of dietary risk, worker exposure, and environmental toxicology.

What is IR-4?

IR-4, a national program headquartered at Rutgers University, was organized in 1963 by the Directors of the State Agricultural Experiment Stations (SAESs). It serves as a major resource for supplying pest management tools for specialty crop growers throughout the United States by developing research data and submitting petitions in support of new EPA tolerances and new labeled product uses. (Tolerances are the maximum allowable levels of pesticide residues in raw agricultural commodities.) IR-4 is funded by USDA in partnership with the SAESs and is the only publicly-funded program that facilitates regulatory clearances for crop protection chemicals on specialty crops. Specialty crops are those crops where the total production is 300,000 acres or less, or crops for which there is insufficient incentive for pesticide registrants to conduct the field testing required by EPA for initial or continuing pesticide registrations. Specialty crops include both food crops and ornamentals. IR-4 also develops research data for minor uses of pesticides on major crops (e.g., corn, wheat, etc.).

IR-4 in the Western Region

The Western Region IR-4 Project, which includes field, laboratory, and quality assurance units, is housed at the University of California, Davis, and represents crop protection needs for 13 western states and the U.S. Pacific Island territories. Becky is responsible for coordinating the Western Region field elements of the four major IR-4 programs—Food Use, Ornamentals, Efficacy, and Biopesticides. Her role involves coordinating the needs of growers and commodity groups throughout the region and facilitating the conduct of the region's various field research programs.

The Food Use Program. Becky spends the majority of her time coordinating the Food Use Program, which is the largest. This program



Becky Sisco

Diane Clarke

conducts field residue trials to generate analytical (residue) data used to determine pesticide residues in food crops. The goal of these trials is to provide residue data needed by EPA to set tolerances, a required component of the pesticide registration process for pesticides used on food or feed crops. Becky's work on the Food Use Program can be described in terms of "front end" and "back end" activities.

The "front end" involves obtaining information from stakeholders in the region about their pest management problems, i.e., what products they need on what crops. This involves outreach of various sorts to understand what the needs are. Becky travels to field days and extension meetings throughout the region to get a sense of the problems and how IR-4 might be able to help. Another element of the front end outreach is carried out by the IR-4 State Liaison Representative (SLRs), who stay in touch with stakeholder needs in each state. Becky meets annually with the region's SLRs, which gives

her an opportunity to hear regularly about each state's needs. Rotating the meeting to different locations each year allows a showcasing of different areas of the region. In addition, Becky maintains an email list of people who have expressed interest in the work of IR-4 in the region. She uses the list to keep people informed about new projects and their possible specific chemical-crop uses in the West. Anyone from the email list may participate in the two conference calls held per year in preparation for the annual Food Use Workshop, IR-4's national priority-setting meeting.

Becky's "back end" work on the Food Use Program involves coordination and facilitation of field research trials in the region. Becky is responsible for all project management, both technical and logistical, which means overseeing issues such as where to do the trials, who needs to do them, ensuring that the people executing the work have the proper resources to get it done, ensuring the work is Good Laboratory Practice (GLP) standard-compliant, and making sure the data fits the work requested. Field research centers across the region (in California, Hawaii, Idaho, New Mexico, Oregon, and Washington) conduct the work. Stephen Flanagan, Assistant Regional Field Coordinator for the West, also does a lot of the support for the Food Use Program and makes numerous visits to the field research locations.

The Efficacy Project. The Efficacy Project determines efficacy on compound-crop combinations when and where needed in the event these data are not available from other sources. This project mainly supports the Food Use Program. "The ultimate goal is that the product can be labeled and made available to the growers. To this end, the efficacy work goes toward filling in any gaps to support work we are doing on the food," Becky said.

The Biopesticides Program. The Biopesticide Program is a national competitive grants program to encourage the development and registration of biopesticide products. Becky administers the grants that are awarded in the West, answering questions about the annual Request for Proposals, coordinating the application reviews and annual meetings to determine availability and allocation of money, distributing funding to grantees, and overseeing reporting by grantees.

The Ornamentals Program. The Ornamentals Program is designed to provide efficacy and phytotoxicity data in support of registration of pest management tools for use in the ornamental industry. "The value of ornamentals is so high," said Becky, "you have to look at a lot of plants to be sure it's an appropriate use and you're not going to harm the plants. It's both efficacy and crop safety." Again, Becky relies on the SLRs for their help on this project. California, Washington, Oregon, Colorado, and Hawaii are all involved. She added, "This program is growing. One of my goals is to improve our outreach in the Ornamentals Program and develop the input from stakeholders."

Quality Assurance Unit and Trace Analytical Laboratory

Becky works closely with Western IR-4's Quality Assurance and Trace Analytical Laboratory units. She sees all of the lab data, and in turn passes these data along to the people who provided the samples so they know the results of their work. On quality assurance, Becky said, "We try to maintain a high standard of work in the region," adding that her Quality Assurance unit colleagues, who are responsible for GLP compliance in the field research and who conduct all of the field inspections, keep her informed about what they are seeing in their audits. This allows her to respond quickly to issues that may arise in the field.

Interregional Coordination

Becky noted there is an effort to have more coordination among IR-4's different regions. In a quarterly conference call among the regions, Becky solicits topics of interest. They try and cover topics that affect all of the regions. Currently, the topic is enhancing and improving the Efficacy Project. Becky said, "Often, if there's a protocol issue or data generation issue that affects all regions, we use the conference call to discuss that and get some resolution." Becky works most with the southern region Field Coordinator, because they have the tropical regions in common and there is some crossover of stakeholder needs.

Current Issues in the West

Becky said pressing issues in the region include the reality of overburdened Extension personnel who find it harder and harder to find time to participate. However, she emphasized what is most important is for them to know that IR-4 is there for them if issues do arise. "It's always a challenge," Becky said, "to remind them that we're here to help without causing them additional work. How do you stay available to them and serve them but not impinge on their limited and valuable time?" As for other issues, Becky went on to cite several ongoing tensions the Western Region faces, including

- Invasive species—balancing the ongoing challenge of managing the pest vs. preserving the industry
- Endangered species—balancing the search for products that protect them vs. the need to provide sufficient tools to produce food
- Water and other environmental issues—balancing rights to clean water, etc. vs. responsible use of pesticides to make sure there is enough food to feed people

Becky said her favorite aspect of her work is the problem-solving and strategic planning she does when it comes to regulatory issues. For example, when a relied-upon labeled crop use goes away, "both regulatory folks and growers are in a hard place," she said. "How do you solve the problem expeditiously, allowing EPA to do what they have to do and the growers to have a replacement as soon as possible?" Becky's overall workload and responsibilities for the region are heavy, and she said this is the one mitigating factor in her enjoyment of her work. "The volume makes it challenging to make sure everything is done as well as I'd like," she said.

Asked about the most important thing she has learned in her role with IR-4, Becky answered, "The strength of IR-4 is that you have no real chain of command in the sense of a traditional organizational structure, so you're dependent on people participating and doing their job because they want to." Becky has been learning how to encourage and support that. She went on, "You really need to say what you mean and mean what you say. Actions speak louder than words. I feel like the best I can do is try and deliver something to people, and if I hold up my end of the bargain, they'll hold up their end. It's a program built on that mutual trust and commitment." She added, "The Western Region is made up of a lot of dedicated people, and they are all such good people to work with. It is a privilege to be among these people. Working with them is just a good experience."

Becky was born in Hartford, Connecticut and grew up in New Jersey. She earned both her Bachelor of Science degree (Plant Protection) and her Master of Science degree (Integrated Pest Management) at Purdue University. She loves the outdoors and chose plant protection in part so she would have plenty of good excuses to work outside. Becky's other passion is dogs, which she trains. She lives in Woodland, California, with her husband, Joe, and their three dogs, Eddie, Ricky, and Payton.

Anyone in the West with a need to register a particular pesticide on a crop is encouraged to contact their SLR or the IR-4 Western Region office. Becky said, "We're available, and we're here to assist." She can be reached at (530) 752-7634 or rsisco@ucdavis.edu.

State Brief

HAWAII

and the American Pacific

Pest Management People

Fred Brooks has joined Charles Nagamine in Hawai'i's Pesticide Safety Education Program (PSEP). Dr. Brooks's contributions to the program include writing articles for and laying out the newsletter, *The Pesticide Label*; presenting some lessons at the Hawai'i PSEP pre-certification short courses; content maintenance of the program's Web site; and interfacing with pest management groups such as the Coordinating Group on Alien Pest Species. Dr. Brooks comes to Hawai'i from American Samoa Community College, where he served as the plant pathologist, IPM Coordinator, and liaison to the Western IPM Center.

Dr. Sabina Swift has retired from the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa. For nine years, Dr. Swift has been a valuable resource for the immigrant farmers of vegetables, papaya, and coffee on the islands of O'ahu and Hawai'i. USDA and EPA funded her 13 projects, totaling more than \$900,000. Using these awards, she conducted IPM training for small farmers who spoke many different languages and assembled teams of county agents, extension specialists, and others to teach not just pest management but also general crop production, crop insurance, soil and tissue sampling and analysis, nutrient management, cost of production, marketing, taxation, and recordkeeping. Mahalo, Sabina!

Invasive Pests

Hawai'i records about 30 new insect pests annually. Some of these become serious pests of agriculture systems, landscapes, and the natural environment. Pickleworm (*Diaphania nitidalis*) was not known to occur in Hawai'i prior to November 2003. In June 2004, the WIPMC Comment Coordinator for the American Pacific reported that pickleworm was a potential economic pest that had become widely distributed, damaging cucurbit crops in Hawai'i. Last August, growers, extension staff, and other stakeholders met in 'Aiea, Hawai'i for the workshop for the Pest Management Strategic Plan for Cucurbit Production in Hawai'i and on Guam. At the workshop growers and extension agents identified pickleworm as one of the most important pests impacting Hawai'i's cucurbit growers, affecting all crops except watermelon, bottle gourd, and bitter melon.

The tomato yellow leaf curl virus (TYLCV) causes a destructive disease of tomatoes. In tropical and subtropical regions, total losses of tomato crops have been reported. TYLCV is widespread and can be found in most places where tomato is grown. TYLCV was first discovered in Hawai'i on the islands of Maui and O'ahu, in November of 2009. The sweet potato whitefly (*Bemisia tabaci*) and the biotype B (or silverleaf) whitefly (*Bemisia argentifolii*) are the primary vectors of TYLCV. In response to the vacatur of all registrations of the insecticide spirotetramat, the WIPMC Comment Coordinator for the American Pacific reported that tomato growers anticipate the need for additional whitefly controls to prevent development of resistance.

University of Hawai'i Honeybee/Varroa Mite Project

By Ethel Villalobos

The arrival of the *Varroa* mite in 2007 changed the idyllic nature of beekeeping in Hawai'i. Ironically, the conditions that promote honeybee colony growth also favor a high reproductive success for *Varroa*. Consequently, unique treatment options are needed for the Hawaiian Islands. In 2008, Drs. Mark Wright and Ethel Villalobos, researchers in the University of Hawai'i at Mānoa's College of Tropical Agriculture and Human Resources (CTAHR), received funds from the Hawaiian Department of Agriculture to assist with the control and management of the *Varroa* mite.

The University of Hawai'i (UH) team focuses on testing and developing organic treatments for mite control. The choice to work on alternative methods of control rather than the commonly used miticides was based on "hindsight," as researchers in the mainland United States have begun to notice that although synthetic chemicals can control mite

populations (at least before resistance is developed), long-term exposure to miticides can also produce detrimental effects on bee health. These effects include poor development of queen bees, reduced fertility in drones, and reduction in immune response of worker bees.

In July, 2009, the bee research team began testing a new mite control treatment based on formic acid, called Mite Away Quick Strips (MAQS). Formic acid is an



Honeybee on an herb (borage).

organic acid found in many flower nectars and fruits, and it can also be found naturally in honey. Honeybees have a higher tolerance to formic acid than do the mites, making it ideal for reducing mite numbers while safeguarding the bees. Unlike synthetic chemicals, formic acid leaves no residue within the hive that can accumulate in wax or honey and pose a health risk to consumers. The formic acid in the MAQS is embedded in a slow-release gel, which is effective even during warm summer months, making it useful in Hawai'i. The formic acid treatments proved to be highly effective in mite control, and as a result of collaboration with the Hawaiian Department of Agriculture, the MAQS are now registered for use in Hawai'i under a Special Local Needs permit. Hawai'i is the only state that has access to this new product to date.

The decline in bee abundance brought on by the *Varroa* mite has not only caused concern for beekeepers and honeybee queen breeders but



Lito and Dory Tolentino, a husband and wife who are small-scale vegetable farmers, have become beekeepers with the help of the project.

for vegetable and fruit growers as well. The UH team is well aware of the widespread impact of pollinator decline, and it is working at different levels to address this problem. Some of the current work involves collaboration with international researchers on molecular studies of bee microsporidian diseases and viruses. Viral diseases, which are spread by *Varroa* mites, are believed to play a major role in the collapse of honeybee colonies. There is very little known about the unique viral landscape of Hawai'i and how the arrival of *Varroa* could relate to the expression of these diseases. Currently, research partners at Sheffield University in England are analyzing bee samples collected in the main Hawaiian Islands for viruses.

The UH Honeybee/*Varroa* Mite Project is also offering training workshops on *Varroa* management and teaching growers how to keep bees on their farms. The CTAHR team just received funds from EPA to begin a pesticide reduction project with cucurbit farmers. Cucurbit crops, which are dependent on bees for pollination, are also very susceptible to insect pests and thus are often sprayed with pesticides by growers. This kind of outreach/research project provides an opportunity for local research transfer and helps promote healthier agro-ecosystems.

More work is needed to develop an IPM strategy for *Varroa*, but unfortunately a new honeybee pest, the Small Hive Beetle, *Aethina tumida*, was discovered in May on the Big Island, making it even more pressing to continue to safeguard the health of Hawai'i's honeybee colonies and the sustainability of food production.

For more information on CTAHR's work on honeybees please visit http://www.ctahr.hawaii.edu/wrightm/Honey_Bee_Home.html. Ethel Villalobos can be contacted at emv@hawaii.edu.

State Brief

New Arizona Pest Control Advisor Study Manual

The Arizona Crop Protection Association, in collaboration with the University of Arizona (UA), the Arizona Pest Management Center, the Arizona Department of Agriculture (ADA), and Western Growers Association, recently published a new *Arizona Pest Control Advisor Study Manual*. This is a significant revision and expansion of the previous manual, which was published nearly 20 years ago. The manual prepares Pest Control Advisors (PCAs) for the state PCA licensing exam, which has also been fully revised. The central theme of the new manual is Integrated Crop Management. Topics include pesticide laws and rules, equipment, food safety, invertebrate and vertebrate

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pests of agricultural crops, IPM, resistance management, plant pathology, nematology, weed management, harvest aids, and plant growth regulators. The manual is about 600 pages long, including many color plates, and comes bundled with a copy of the UC IPM publication, *IPM in Practice: Principles and Methods of Integrated Pest Management* (Flint & Gouveia, 2001). Nearly 20 experts from UA and ADA served as authors, and most sections of the manual were also reviewed by practicing PCAs. The manual is available from the Arizona Crop Protection Association, <http://azcropprotection.com/>.

with ground covers; buffer strips; and bioremediation using enzymes applied to the contaminated soil surface. Alternative pest management practices included the use of monitoring along with earlier or no dormant sprays and in-season treatments as needed; alternative conventional pesticides (those not of regulatory concern); alternative pesticides with a narrow pest spectrum; and the use of IPM, promoting reduced use, reduced risk, and a systems approach. Sampling of runoff at research locations showed that implementation of IPM, together with alternative site management practices, can significantly reduce the load of target pesticides leaving treated areas.

Robert Mahler, Professor of Soil Fertility, University of Idaho (UI), gave a presentation on the crucial role played by social science methods in determining outcomes in his work with water quality issues. Mahler serves as UI's team member for the Pacific Northwest Regional Water Program, part of a cooperative regionally-based national network in USDA-NIFA's National Water Program.

Mahler stressed that short-, medium-, and long-term outcomes show the value of a program, and that documented outcomes are increasingly emphasized by funders. The Pacific Northwest Water Program has relied on social science methods of measuring change (i.e., consumer surveys) to document the outcomes of their research and extension efforts. Examples of short-term outcomes they look for include changes in knowledge, behaviors, and motivations, while examples of long-term outcomes would include an increased capacity to deal with water issues and improved region-wide water quality and conservation. A 2002 consumer survey in the region documented that consumers have more awareness of water issues and that behavior has changed (e.g., 59% of residents have installed at least one water-saving device). Mahler emphasized the importance of identifying desired short-, medium-, and long-term outcomes from the beginning of any program-planning process.

Afternoon Session: Group Brainstorming and Planning

Represented at the afternoon brainstorming session were IPM and water quality researchers and educators, the Natural Resources Conservation Service, the Agricultural Experiment Station program, the plant protection industry, and Cooperative Extension Farm Advisors.

Ideas suggested for collaboration included:

- Management of invasive species near waterways
- Partnering with universities and other agencies to develop a set of water quality pest management BMPs and to create a process for evaluating them

- Partnering with NRCS and other experts to focus on how to keep pesticide products on crops and how to keep water on irrigated fields, highlighting application technology, drift reduction, pinpoint placement, irrigation and stormwater runoff management, etc.
- Development of an IPM and Water Quality Certification/Professional Development Program. Clientele could include Conservation District staff, Master Gardeners, growers, Pest Control Advisers, private consultants, grower commodity groups, urban horticulture practitioners, NRCS Technical Service Providers, etc.
- Development of an IPM and Water Quality Western Education/Extension and Research Activity (WERA) Committee.
- Creation of a Web-based IPM/Water Quality clearinghouse (e.g., including weather conditions, spray application technology, etc.).
- Targeting of urban water quality problems
- Development of train-the-trainer programs

In the course of the brainstorming session, the group decided to focus on pursuing funding for a WERA committee, which would enable a wide range of land grant and non-land grant IPM and water quality researchers, educators, and practitioners representing the entire region to collaborate on IPM and water quality objectives on an ongoing basis. Co-leaders of this effort will be Pete Goodell, IPM Advisor, University of California Statewide IPM Program, Bob Mahler, and Linda Herbst. WERA committees, and other so-called Western Multistate Projects, are sponsored and coordinated by the Western Association of Agricultural Experiment Station Directors (WAAESD). The projects are funded by the Multistate Research Fund—federal formula funds that by mandate must be spent on multistate research (Hatch Act, 1946; Agricultural Research, Extension, and Education Reform Act, 1998).

The group developed a set of desired outcomes and outputs for the proposed WERA committee. Long-term outcomes included reducing pesticides and other contaminants in water and improving food and water security. These outcomes would be measured by utilizing existing monitoring data and collecting additional monitoring data as appropriate. Intermediate outcomes (behavior changes) included increased adoption and use of effective IPM BMPs by farmers, ranchers, institutions and municipalities, landscape professionals, and homeowners. This would be measured using surveys and by documenting increases in industry association certification programs involving IPM and water quality standards. Short-term outcomes (knowledge changes) included increased awareness and knowledge of water quality issues and increased expertise in appropriate IPM strategies among Master Gardeners, conservation districts, landscapers, Technical Service Providers, etc.

Possible outputs of the proposed WERA committee included:

- A core Web-based IPM and Water Quality curriculum that can be adapted to different needs (e.g., general public, agricultural professional development, K–12, agencies, universities, local areas in different states)
- Web-based IPM and Water Quality Information Clearinghouse
- Annual IPM and Water Quality Region-Wide Conference that is rotated throughout the region
- An IPM and water quality module for IPM³

Attendees supporting the WERA bid and interested in participating in a new IPM and water quality group represented these western states: Alaska, California, Idaho, Oregon, Washington, and Wyoming. The group agreed to seek broad stakeholder participation region-wide.

In a brief panel presentation following the brainstorming session Dirk Heller of USEPA, Rick Melnicoe of the Western IPM Center, and Dee Carlson of NRCS, Idaho, spoke and fielded questions about funding opportunities pertinent to IPM and water quality efforts.

PMSP Update

Ongoing:

- **Bivalve (Oregon, Washington):** In final editing
- **Citrus (California)**
- **Cucurbit Crops (Hawaii, Guam):** Workshop held in August 2009
- **Desert Turf (Arizona, Nevada, and Southeastern California)**
- **Grass Seed (Idaho, Oregon, and Washington)**
- **Low Desert Cotton (Arizona and Southeastern California)**
- **Pear (California):** Being updated
- **Seed Potato (Alaska, California, Colorado, Idaho, Montana, Oregon, Washington):** Workshop held in May
- **Turf (Hawaii)**



Diane Clarke

Working Together to Develop IPM Programs on Tribal Lands

By Susan Ratcliffe

The Regional IPM Centers are collaborating with the EPA Tribal Pesticide Program Council (TPPC), USDA Tribal Education Equity and Extension Programs, 1994 and 1862 Land-Grant institutions, First American Land-Grant College and Organization Network (FALCON), and First Nations to increase IPM practices and reduce pesticide usage and risk on reservations. The development of culturally sensitive IPM curricula and training modules allows for greater acceptance and implementation of IPM practices on the 56 million acres of tribal land. The program focuses on developing relationships at the state, regional, and national levels to share knowledge of existing practices and foster adoption of these practices by other First Nations. Dr. Susan Ratcliffe, director of the North Central IPM Center, and key tribal representatives were awarded a USDA-CSREES grant in 2007 to begin work on the tribal IPM project. In October 2009, a Tribal IPM Summit was hosted in Washington, D.C., to identify high priority issues that included training in IPM. As a result, two trainings have been scheduled for 2010. In August, a pesticide tracking and risk assessment training will be conducted in cooperation with Hector Duran, Colorado River Indian Tribe, in Parker, Arizona. In September, a community IPM gardening training will be conducted in cooperation with Virgil Dupuis, Salish Kootenai College, in Pablo, Montana. The group hopes to develop a Native American Small Farm Working Group in the future to address pest management issues and share successful IPM programs on reservations.

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State Briefs

Two New Plant Pest Faculty to Join Utah State University on August 1

Claudia Nischwitz will join Utah State University as a plant pathologist. Claudia has experience with plant disease management in vegetable and turfgrass systems and currently directs a plant disease diagnostic laboratory at the University of Arizona. USU has also hired a new entomologist, Ricardo Ramirez. Ricardo studied integration of entomopathogens into potato systems for Colorado potato beetle management at Washington State University before joining the cotton insect ecology research program at Texas A&M University.

IPM Demonstration Grants

Sometimes an on-the-spot demonstration is the way to convince people to use an IPM practice. In the second year of the University of California Statewide IPM Program's competitive IPM extension grants program, a wide range of projects demonstrated new techniques in the field or took established IPM methods to new audiences. Results showed knowledge gains, intentions to adopt methods, and in some cases, new use of IPM practices.

Projects supported a community-wide program for controlling codling moth in backyard apple trees, dramatically reducing codling moth damage; showed day care providers and parents to use IPM to protect children; and demonstrated differing effects of nonchemical nematode-management strategies on root-knot nematode levels, tomato plant growth, root symptoms, and tomato yield to the gardening public. Extension advisors evaluated several types of traps and demonstrated effective strategies for trapping as part of an IPM approach to gopher management. And in natural areas, leaders trained participants to build small "solar tents" to kill invasive plants that had been cut down. Use of the tents eliminates the spread of the plants' seed or propagative materials during their transport out of the area.

The future of funding for the grants program is uncertain. Project reports are posted at www.ipm.ucdavis.edu/grants.

Mark Your Calendar

2010

June

- 2010 International Groundwater Conference, June 15–17, Burlingame, California.
<http://www.watereducation.org/doc.asp?id=1070>
- 2010 Joint Annual Meeting and Conference Canadian Phytopathological Society with the Pacific Division of the American Phytopathological Society, June 20–23, Vancouver, British Columbia.
<http://www.cps-scp.ca/index.shtml>

July

- International Society of Arboriculture Annual Meeting, July 23–28, Chicago, Illinois.
<http://www.isa-arbor.com/conference/default.aspx>
- Botany 2010, July 31–August 4, Providence, Rhode Island.
<http://www.botanyconference.org/>

August

- 95th Annual Ecological Society of America Meeting, August 1–6, Pittsburgh, Pennsylvania.
<http://www.esa.org/pittsburgh/>
- 2010 APS Annual Meeting, August 7–11, Nashville, Tennessee.
<http://meeting.apsnet.org/default.cfm>

September

- 2010 IR-4 Food Use Workshop, September 14–15, Summerlin, Nevada.
<http://ir4.rutgers.edu/index.html>

November

- 2010 Western Plant Diagnostic Network Regional Meeting, November 9–10, Davis, California.

December

- Entomological Society of America 58th Annual Meeting, December 12–15, Town and Country Hotel & Convention Center, San Diego, California.
<http://www.entsoc.org/am/fm/index.htm>

2011

- 2011 National Plant Diagnostic Network meeting, November 6–9, 2011, (field trip November 10), San Francisco, California.

2012

- 7th International IPM Symposium, March 27–29, 2012, Memphis, Tennessee.

For more information, see "News/Announcements" and "Funding Opportunities" on the WIPMC Web site.

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