



2011 Annual Report

Western Integrated Pest Management Center

WIPMC

Director's Comments

This is the seventh annual report of the Western Integrated Pest Management (IPM) Center. During the past year the Center received additional funding for one more year and has been spending out the remaining funds of our 2007 4-year grant; continued supporting the Legume *ipmPIPE* (Pest Information Platform for Extension and Education) for state monitoring programs; continued to manage the Regional IPM (RIPM) Competitive Grants Program—Western Region; funded work groups, publications and outreach materials, surveys, and Pest Management Strategic Plans; and participated in national and regional meetings, workshops, and symposia.

The Western IPM Center is one of four regional IPM centers in the United States. Each center is unique in the issues it addresses, but all follow the overarching guidance of the *National Road Map for IPM*, which identifies integrated pest management goals for agricultural, urban, and natural systems. The *Road Map* is available at <http://www.ipmcenters.org/ipmroadmap.pdf>. The goal of the National IPM Program is to improve the economic benefits of adopting IPM practices and to reduce potential risks to human health and the environment caused by the pests themselves or by the use of pest management practices. The Western IPM Center, through the guidance of its Advisory and Steering Committees, has structured all of its programs to follow the *Road Map*, and it reports the impacts of its funded projects. Funding provided to the Western IPM Center comes primarily from the United States Department of Agriculture, National Institute of Food and Agriculture (USDA-NIFA). This funding is used to support Center activities and programs.

Pest Management Strategic Plans (PMSPs). Regional staff, along with growers, crop consultants, industry groups, and university researchers, develop Pest Management Strategic Plans. These documents are used by industry and by state and federal authorities as they try to understand pest management uses and needs in agricultural and other settings. The IPM in Schools PMSP involved a completely different approach and different participants from those utilized in crop PMSPs to develop a plan for IPM implementation in all K–12 schools in the United States by the year 2015.

Grants. As research and education needs are identified through the work groups and other stakeholders, the Western IPM Center is able to provide some funding via annual grant programs and through small startup grants. The small startup grants can be quickly funded to address newly emerging issues, such as a disease or other pest outbreak. Addressing Western IPM Issues grants focus on problems identified by stakeholders, work groups, and PMSPs or other documents. These grants may involve research, extension, or a combination of both.

Work Groups. Focused, multi-state work groups are funded to address particular issues, such as pesticide resistance management, urban IPM, weather modeling and pest forecasting, and other topics. These work groups have been enormously successful in leveraging other funds to address issues identified as important in the West. Several large grants have been obtained by work group members as a result of the small amount of support provided by the Western IPM Center. See “Leveraging” section of this report.

Advisory and Steering Committees

Two standing committees guide the Western IPM Center. The Advisory Committee provides vision and guidance. Its members represent a wide range of stakeholders and link the Center to stakeholder needs and priorities for pest management programs in the West. These advisors, integral to Western IPM Center outreach, promote awareness of the Center's resources to their own constituencies and beyond. The Steering Committee gathers input from stakeholders (including the Advisory Committee), determines broad policy goals and priorities, recommends Center budgets, and provides direction for timely and effective Center management. In the pages of this report we highlight some of the projects, people, and impacts that have made the Western IPM Center successful in fostering responsible pest management for a sustainable future.

On a final note, this is the last Annual Report that I will be overseeing, as both Linda Herbst and I will be retiring on July 1, 2012. We have accomplished all of our goals over the past 10 years, and I am proud of the work that the western region has done to improve IPM adoption. The WIPMC has never been about the staff that manage it; rather, it is about the people throughout the West who participate in its activities, provide valuable guidance, and do excellent research and extension. Thank you all for your support and participation.

Cover Photos:

(clockwise from top left) **Seattle.** By Gary Wilson, USDA Natural Resources Conservation Service; **Feeding Corriedale sheep on a ranch in Montana.** By Bob Nichols, USDA Natural Resources Conservation Service; **Horseweed.** By James H. Miller and Ted Bodner, Southern Weed Science Society, Bugwood.org; **Spotted wing drosophila.** By Hannah Burrack, North Carolina State University, Bugwood.org; **Light brown apple moth damage.** By the Department of Primary Industries, Park, Water, and the Environment, Tasmania Archive, Tasmania, Australia, Bugwood.org; **Mountain pine beetle (*Dendroctonus ponderosae*).** By Ron Long, Simon Fraser University, Bugwood.org

Highlights of WIPMC Grants Programs

The following highlights of WIPMC grants programs show the breadth of projects funded and the impacts made to improve the economic benefits of adopting IPM practices and to reduce potential risks to human health and the environment caused by the pests themselves or by the use of pest management practices.

Seasonal Phenology of the Beet Leafhopper in Relation to its Weed Hosts and Beet Curly Top Virus Infection

Principal Investigators: Rebecca Creamer, C. Scott Bundy, Jill Schroeder, and Leigh Murray, New Mexico State University



G. Oldfield, USDA, Bugwood.org

Summary: This research project addressed management of beet curly top virus (BCTV) and related curtovirus species transmitted by the beet leafhopper, *Circulifer tenellus*. These viruses cause economic damage throughout the western United States, affecting tomato, pepper, melon, bean, sugarbeet, and spinach. In New Mexico, curly top disease causes substantial losses to chiles (more than 50 percent in some years). Management of BCTV and its vector has proven difficult due to the wide host range of both. In a previously funded project, researchers found that London rocket (*Sisymbrium irio*) may be a primary overwintering host for the beet leafhopper and curly top in New Mexico in years when fall precipitation occurs to stimulate emergence of the weed. Removal of weed hosts of the virus and vector would be an effective management tool; however, information on when and how the vector interacts with its weed hosts was necessary for optimal weed removal to control disease spread. The overall project objective was to determine the seasonal phenology of the beet leafhopper in southern New Mexico in relation to weed host phenology and habitat. Specific objectives included 1) establishing the phenology of the beet leafhopper on London rocket and kochia (*Kochia scoparia*) as key winter and summer hosts and assessing the suitability of habitat of these weeds for beet leafhoppers using field surveys, 2) determining the natural incidence of curly top on London rocket in different months of the year, and 3) refining management recommendations for curly top.

Results: Beet leafhopper populations were evaluated once a week in southern New Mexico at multiple locations from January 2008 through December 2009. Researchers found that beet leafhopper completes one distinct generation (and a possible second) on weedy hosts—considerably fewer generations than previously speculated in the literature. These data give project researchers an excellent picture of the timing of adult and nymphal populations as well as egg-laying periods. Project researchers showed that beet leafhopper completes its development on London rocket and kochia, confirming these weeds as important hosts. Evaluation

of the effects of site characteristics upon *N. tenellus* populations showed nymph presence was greater in fallow field sites containing larger patches of weeds. London rocket was evaluated for presence of curly top at several locations throughout southern New Mexico. This weed appears key to managing the system. Seedlings begin development in the fall and beet leafhoppers are ovipositing in late winter. Therefore, the weed should be targeted in fall while it still may be managed and before the leafhoppers have a chance to build populations.

Impacts and Potential Impacts: The results of this research will provide New Mexico growers with critical information on the associations among beet leafhopper, beet curly top virus, and key weed populations, as well as the seasonal timing of these associations, providing management tools to better deal with this pest complex. Project data should offer the potential to reduce insecticide applications and the resulting environmental exposure. Development of better management strategies based on these new data should result in better yields and increased profits.

Outreach to Preserve Pheromone Mating Disruption Programs in California and Oregon Pear Orchards

PIs: Rachel Elkins and Kris Lynn-Patterson, University of California Cooperative Extension; Richard Hilton and Philip VanBuskirk, Oregon State University



Rick Mehnicoe

Summary: Since the early 1990s, pear growers, researchers, and extension personnel in the West have worked hard to establish and maintain pheromone-based, area-wide IPM programs, but population and land use changes are jeopardizing these programs. Residential growth has encroached into key pear growing areas of California and Oregon. In addition, pears have struggled economically due to decline of the cannery market and global competition. The combined effects of residential migration and economic difficulty have resulted in increased numbers of abandoned commercial orchards; scattered, unfarmed trees on “ranchettes,” and unmanaged residential backyard fruit trees. These trees harbor many pests. When they are located in proximity to responsible commercial pear growers, pests migrate into neighboring commercial orchards and create problems for growers, who then must use more and harsher pesticides. Though codling moths have a limited host range,

even a single unmanaged tree can ultimately produce hundreds of mobile moths that can then move into surrounding orchards. This outreach project proposed a combined effort for northern California and southern Oregon. Objectives included 1) identifying and characterizing locales of unmanaged trees that may harbor pests, threatening the IPM program success of commercial growers; 2) conducting education and outreach to the residential population within ¼ mile of commercial pear orchards, educating them on how to implement responsible IPM practices for backyard apple and pear trees and on the implications for neighboring commercial growers of harboring pests in those trees; 3) encouraging residents to remove backyard apple and pear trees by offering industry-provided incentives; and 4) collecting, summarizing, and sharing project data with relevant agencies, other potential user groups, and the research/extension community.

Results: Outreach methods used by project collaborators have included newspaper articles, an annual gardening calendar, information booths at public events and farmers’ markets staffed by University of California Master Gardeners, and cooperation with local nurseries. Residents are being encouraged to 1) ideally, remove unmanaged trees and replace them, if desired, with recommended low-maintenance shade trees or other non-threatening fruit and nut trees, and 2) properly care for trees and manage pest populations so they do not pose a problem to commercial pear growers.

Impacts and Potential Impacts: Program effectiveness is being measured by documenting the number of unmanaged trees before, during, and at the end of the program. Consumers of the project’s information are being surveyed on the usefulness of the products, whether they have learned anything, and whether their behavior has changed. Preliminary results less than a year after the program began showed that many more people were aware of the problem. Individual homeowners have started to remove unmanaged trees, and an owner of an abandoned orchard in Lake County, California, is working with the agricultural commissioner to find a cost-effective way to take out the orchard. Two unmanaged orchards in Jackson County, Oregon, were removed. Because of the growing awareness of the issue and the efforts of Master Gardeners who are promoting low-maintenance, drought-tolerant plantings, homeowners who are not willing or able to spend a lot of time tending to fruit trees are becoming increasingly interested in planting low-maintenance trees, natives, and xeriscape plants.

Innovative Outreach for City Parks to Implement IPM Strategies

PIs: Shelley Connor, Northwest Center for Alternatives to Pesticides; Tim Stock, Oregon State University

Summary: Research shows that pesticides used in yards and public spaces often end up in rivers, threatening water quality and making wider adoption of IPM in urban settings critical. Many city park employees in the Northwest have been leaders in adopting IPM techniques. As the number of city parks managed without pesticides grows, city park managers still often



work in isolation and lack information and techniques for managing weeds without herbicides. The overall goal of this project was to develop innovative, interactive tools and conduct outreach to increase implementation of IPM strategies among city park employees across the West. Specific project objectives included 1) launching an online site that hosts a blog, discussion forums, a resource list, and other social networking features, where city park managers can share information and resources on proven, successful IPM strategies used in managing parks; 2) interviewing at least five city park managers to create at least 12 blog posts on proven, successful IPM strategies; and 3) creating five 3- to 5-minute videos on specific IPM practices used in maintaining city parks to post on the site.

Results: Project participants developed user-generated content and officially launched the Sustainable Parks Information Network (SPIN) Web site to support city park managers. The project has provided a means for innovative, peer-to-peer outreach and IPM education for park employees throughout the West. During the project period there were 18 blog posts on proven, successful IPM strategies. The site has added archived PowerPoint presentations and 10 short videos highlighting IPM practices and discussions with IPM professionals. Members have the ability to contact each other directly or to start public discussion threads. After the site was launched, collaborators conducted outreach through 1) periodic emails to members, 2) highlights in the Northwest Center for Alternatives to Pesticides' *Action News*, 3) direct meetings and video projects with SPIN members in Washington, Oregon, California, and Montana, and 4) 20 presentations to landcare-specific audiences reaching more than 600 potential SPIN members. Site membership grew from 25 initial and founding members to 92, increasing roughly threefold.

Impacts and Potential Impacts: Of SPIN members surveyed, 70 percent claimed the network had helped them connect with others in their field to learn about IPM. The same group also reported they had recommended SPIN to their peers. Forty percent indicated they had been active in producing content for the site in the form of a blog, video, or discussion question. Around 50 percent stated specifically that they have reduced their use of pesticide chemicals or have changed their practices to include only least-toxic pesticides. Ninety percent indicated they had tried new IPM techniques as a result of discussion occurring through or because of the site. Through a local campaign, SPIN members in Ketchum, Idaho, worked with city administration and staff and local landscapers to craft a new, county-wide IPM policy for

parks and public spaces. The new policy explicitly prioritizes preventive, ecological, and non-chemical steps for pest management. This project has expanded to accommodate the growing interest in applying IPM techniques in schools, low-income housing units, and other urban public spaces. Forums specific to these venues are currently under development on the SPIN site.

Utah Tree Fruit IPM Implementation Survey/Development of IPM Outreach Material for Utah and Colorado Tree Fruit Growers

PIs: Marion Murray, Diane Alston, and Ruby Ward, Utah State University



USDA-NRCS

This two-part project consisted of 1) a grower IPM survey and 2) extension/outreach activities in tree fruit IPM.

Survey. The value of all tree fruit crops in Utah was almost \$17 million in 2006. Because fruit crops receive from 20 to 100 percent more inputs of non-renewable resources than many other crops, tree fruits are a high priority for the Utah State University (USU) Extension IPM program as they seek to enable sustainable IPM practices. Project collaborators surveyed Utah tree fruit growers about their pesticide use and IPM practices. Prior tree fruit pest management surveys provided comparison data for changes in IPM practices over time. Objectives for the survey project were to 1) design and deliver a statewide tree fruit IPM assessment survey and 2) from the survey data, determine the extent of IPM adoption and education/research needs in Utah's tree fruit industry.

Results for Survey: 382 tree fruit growers were surveyed in Utah, with a response rate of 74 percent. Twenty-one percent of respondents considered themselves IPM practitioners, yet 30 percent selected at least seven of 22 IPM practices. Reported barriers to IPM included cost, lack of qualified labor, investment of time, and outside pest pressure (urbanization). Respondents not practicing IPM most commonly said they would adopt IPM if they were guaranteed a 100 percent fail-proof system, if the consumer were better educated in IPM, and if costs were decreased. For pesticide use, those practicing IPM reported greater pesticide reduction than those practicing conventional or organic agriculture.

Extension/outreach. With an increase in small farms in the western United States, new orchardists have a great need for educational resources in tree fruit production. This part of the project was a joint effort with Colorado to produce the first comprehensive commercial tree fruit production guide for the Utah-Colorado region. Collaborators supplemented

the guide with a Web site with short videos on tree fruit pest monitoring techniques and key pest identification, designed to target commercial and hobbyist growers. Objectives for this part of the project were to 1) produce and distribute a regional Utah-Colorado tree fruit production guide in print and online, 2) produce Web-enabled video shorts of IPM tree fruit pest identification and scouting techniques, and 3) develop a Web site to house the tree fruit production guide and scouting videos.

Results for Extension/Outreach: The tree fruit production guide was printed and distributed to almost 500 commercial growers in Utah and Colorado. The Web site design is complete, and project collaborators are adding content. They created several test videos in 2010 and planned to complete the videos in 2011. To evaluate the project, postage-paid postcard surveys were attached to the guides. They also plan to distribute a formal survey, have "mini-survey" links on the Web site, and look at Web site analytics.

Impacts and Potential Impacts: Survey results will allow collaborators to document the successes and failures of the USU IPM program in tree fruits; guide them in future research and education needs in fruit IPM; allow them to gain an improved understanding of changes in, and use of, IPM practices in Utah; and leverage future funding. Growers will potentially experience increased profits because of having up-to-date information on a broad arsenal of pest management options, including state-specific products. They could also save money in scout training costs through the use of the free videos. Increased confidence in implementing IPM strategies could boost IPM implementation, lead to optimized pesticide use, and result in shifts to reduced-risk pesticides. Training videos will equip commercial and backyard growers to better identify pests and implement formal scouting practices. Other states in the Intermountain West could also benefit from this project by participating in future editions of the tree fruit production guide and by linking to the training videos available on their states' Web sites.

Polk County Nutria Control Research Project

PI: Jackie Hastings, Polk Soil and Water Conservation District



John & Karen Hollingsworth, U.S. Fish and Wildlife Service, Bugwood.org

Summary: In Oregon, nutria are a non-native invasive species that pollute water; displace native wildlife; cause damage to dikes, crops, and riparian vegetation; and potentially transmit disease to pets, livestock, and humans. Traditional methods of control (trapping or shooting) can effectively reduce isolated populations, but local efforts are worthless

Impacts: Special Issues

because of the reservoir of nutria that move in and repopulate an area. The purpose of this project is to build the foundation for developing the first Regional Nutria Management Plan in the Pacific Northwest. The plan focuses on collecting data and building alliances with industry and user groups. Data will be used to seek future funding to continue addressing nutria populations and their effects on agriculture, water quality, and human health. Project objectives include 1) educating the public about nutria through workshops and newspaper articles, 2) developing a protocol for documenting nutria damage, 3) documenting nutria damage throughout Polk County, 4) testing nutria throughout Polk County for various diseases, 5) testing nutrias' effect on water quality through bacteria testing, 6) evaluating nutria control measures to determine what methods are most practical and effective, 7) working with landowners to record the number, sex, and size of captured nutria, and 8) compiling all data collected into a final report to be used to as a foundation for creating a Regional Nutria Management Plan in the Pacific Northwest.

Results: Project collaborators produced a newspaper article, workshops, a display at the Polk County Fair, a newsletter article, and fact sheets and fliers that have been distributed throughout Polk County. A data recording sheet was developed that includes nutria activity, damage, location, date, and physical data on captured nutria. Nutria activity has been documented throughout Polk County and physical data recorded on more than 150 nutria. Every nutria in the program has been examined for disease, reproductive status, and tooth extraction (to provide accurate age). Woven wire was installed along pond dikes to evaluate effectiveness against nutria damage. Data are being collected on additional control methods. Size, weight, sex, and location data are being collected on every nutria turned in.

Impacts and Potential Impacts: Ash Creek, a mid-size tributary of the Willamette River, has been listed as critical habitat for juvenile salmon and is monitored by the Oregon Department of Environmental Quality for water quality. A significant health and environmental concern for this area has been the high volumes of bacteria found in the water and the destruction of riparian vegetation. In 2010, more than 100 nutria were removed from this ecosystem through this project. The Ash Creek Water Control District and the City of Independence (through which Ash Creek runs) have been strong partners in the nutria control efforts and feel there has been significant improvement in water quality.

A main objective of this project is to bring natural resource partners together to build a regional Nutria control program. The project has directly resulted in a nutria population study through the Oregon Department of Fish and Wildlife, disease testing through Oregon State University, and an environmental damage study through Portland State University. These research efforts may help build support for additional funding sources.

See the Western IPM Center Web site, <http://www.wripmc.org>, for further details about objectives, results, and impacts of WIPMC-funded projects.

Special Issues Projects Yield Results

The Western IPM Center has an ongoing call for proposals to address special IPM issues in the West. Special issues funding may be requested to convene groups of people to address emerging issues such as new pests or environmental concerns, to develop proposals for larger grants based on documented stakeholder needs, or to develop Pest Alerts. The Western IPM Center has recently funded several projects under this program. The impacts of one of these small grants (up to \$5,000 each) are summarized below:

Project Finds Pesticide Sprays Unnecessary for Zebra Chip Potato Disease in Eastern Oregon

Zebra chip (ZC), a new and emerging disease of potato in the southwestern United States, Mexico, and Central America, causes losses of millions of dollars to the potato industry. Vectored by the potato psyllid (*Bactericera cockerelli*), the disease causes a striped or stained pattern of necrosis in tubers produced on infected plants. Fried chips made from these tubers are commercially unacceptable. Although no ZC has been documented in Oregon or Washington potatoes, the disease could occur in both states. Project researchers surveyed the presence of the vector in Oregon and sought to determine whether potato psyllids migrating in Oregon's Columbia Basin carry the bacterium *Liberibacter* (the putative causal agent of ZC potato disease).

Results and Impacts: Researchers determined that psyllids are present in Oregon and Washington. However, they are not carrying *Liberibacter*, so no control is necessary. Growers are being advised not to spray, thus protecting workers and the environment from unnecessary exposure to pesticides.

The final report for this project can be viewed at <http://www.wripmc.org/centerprojects/specialprojects.html>.



2011 WIPMC-Funded Projects

The Western IPM Center funded five work groups, two surveys, and 10 publications/outreach projects, totaling \$197,156. Second-year funding for four Addressing Western IPM Issues projects totaled \$98,924.

Work Groups

- Southeastern Arizona-Southwestern New Mexico Noxious Weeds
Principal Investigator: Kim McReynolds, University of Arizona
- Western Region Choke Disease Management
PI: Sujaya Rao, Oregon State University
- Western Region Functional Agricultural Biodiversity
PI: Gwendolyn Ellen, Oregon State University
- Western Region School IPM Implementation and Assessment 2011
PI: Tim Stock, Oregon State University
- Crop Pest Losses and Impact Assessment
PI: Al Fournier, University of Arizona

Surveys

- Survey of Insect Management Practices of Stored Rice in California
PI: Luis Espino, University of California Cooperative Extension
- Survey to Assess IPM Implementation in Utah Vegetable Crops
PI: Marion Murray, Utah State University

Publications/Outreach

- Adopting IPM on Oregon's School Landscapes
PI: Aimee Code, Northwest Center for Alternatives to Pesticides
- An Illustrated Field Guide to the Pests of Bivalve Aquaculture in Washington and Oregon
PI: Steven Booth, Pacific Shellfish Institute
- Developing an Educational Program on Semiochemical-Based IPM Methods for Weevil Pests on Guam
PI: Gadi Reddy, University of Guam
- Growing the Sustainable Parks Information Network
PI: Josh Vincent, Northwest Center for Alternatives to Pesticides
- IPM Education and Outreach for Public Housing in Arizona and Oregon
PI: Dawn Gouge, University of Arizona
- Integrated Weed Management in the Great Basin of Nevada and Utah—Education and Outreach: Sixth Annual Winter Weed Meeting
PI: Betsy McFarlan, Eastern Nevada Landscape Coalition
- IPM Education Program for Vineyards and Orchards to Prevent and Manage Glyphosate-Resistant Weeds
PI: Kassim Al-Khatib, University of California Statewide IPM Program
- IPM/Beneficial Insect Outreach and Demonstration
PI: Tessa Grasswitz, New Mexico State University
- Southeastern Arizona-Southwestern New Mexico Noxious Weed Rapid Response Teams
PI: Kim McReynolds, University of Arizona
- Video Production: "An Introduction to IPM" and "The City of Phoenix IPM Program"
PI: Glenn Gigstad, University of Arizona

Further information is online at <http://www.wripmc.org>.



Highlights of IPM in Practice

The Western IPM Center supports and participates in regional and national projects that foster the practice of IPM in a variety of ways. The projects highlighted here are examples of how the Center's support and collaboration help to put IPM into practice.

Spanish Translation of Popular Touch-Screen IPM Kiosk Delivers IPM Information to Spanish-Speaking Californians

In 2007 the University of California Statewide Integrated Pest Management Program (UC IPM), in collaboration with the Healthy Garden/Healthy Home Project managed by UC Cooperative Extension (UCCE) San Diego County, developed a user-friendly, stand-alone, touch-screen IPM kiosk to help educate home gardeners in solving pest problems, preventing runoff from residential landscapes, and protecting the environment. In 2011, Mary Louise Flint, UC IPM's Associate Director for Urban and Community IPM,



received WIPMC funding to translate the kiosk's content and programming into Spanish, make it accessible on UC's 16 existing kiosk units (and 6 additional units owned by other groups), and bring IPM information to California's underserved

Spanish-speaking audiences through local UCCE offices and other outlets. Existing kiosk content includes approximately 200 separate screens, 11 videos, and 39 printouts, encompassing information on 68 different pests, a diagnostic program, and screens covering less toxic management practices. Kiosks are placed in up to 200 different sites per year around California, including retail stores, landscape shows, Master Gardener events, libraries, county fairs, and UCCE offices. Thousands of people around the state access information via the kiosks each month. In addition to translating all kiosk content into Spanish and building a Spanish navigation branch to be loaded on existing kiosk machines, the project's objectives included conducting a preliminary evaluation of the Spanish kiosk at several types of user locations.

While it was not possible to do a formal evaluation during the course of the project (since technical slowdowns prevented the product from being completed until the end of the funding period) all kiosk content was translated into Spanish, the Spanish-language navigation branch was created and loaded, and all Spanish-language content was loaded onto all 22 kiosks in California. The Spanish version has been used in several locations with good feedback from audiences.

Spanish-speaking Californians have had few good sources of information on less toxic ways to manage home and garden insects. The Spanish-language kiosk content will greatly enlarge the University of California's range of resources and enhance the ability to deliver IPM information to Spanish-speaking residents, gardeners, and landscape professionals. Shortly after becoming available at the beginning of 2011, the new kiosk content was used in San Luis Obispo County to train Spanish-speaking maintenance gardeners on diagnosing problems and finding less toxic ways to manage pests. It has also been used in UCCE offices for Spanish-speaking clientele. Flint anticipates broad use in upcoming years by several groups—including Master Gardeners working with Spanish-speaking clientele and UCCE advisors working with maintenance gardeners who read and speak Spanish—and a reduction in use of more toxic pest control products by these groups as a result of this new resource.

Sampling of IPM Activities in the Western Region

Western region Extension IPM Coordinators met in April at the annual meeting of WERA-069 (now called WERA-1017), a multistate extension, education, and research committee focusing on IPM in the West. Below is a small sampling of the diverse and extensive western region IPM activities they reported at the meeting. Full reports were published in the June and October editions of the Western IPM Center's newsletter, *The Western Front*, and can be viewed at <http://www.wripmc.org/newsletter/index.html>.

- Electronic vegetable IPM updates delivered timely information on insect, disease, and weed management topics via Web, email, and smart phone. Two hundred and twenty percent increase in email list membership. Some updates also distributed through farm press and radio outlets.
- Training program equipped paraprofessional consultants to help retail stores promote less-toxic pest management products and solve customer questions with IPM solutions.
- Intensive extension education program initiated on problems associated with invasive weeds and how to manage them using an IPM approach.
- Seventeen IPM practices were covered in presentations, demonstrations, and field tours at an integrated crop and livestock management workshop for extension, water conservation, Natural Resources Conservation Service, USDA, and other personnel.
- Pheromone lures and traps used to monitor cutworms infesting crops. Data entered into an online risk warning system linked to degree day models for predicting emergence and growth.
- Two full-day IPM interactive displays conducted for teachers, students, youth, farmers, homeowners, and the general public.



Participants given the opportunity to operate stereo microscopes to observe insect and disease pests.

- Free, weather-based decision-aid service has more than 5,000 subscribing members. Network

includes 134 weather stations and several linked tools that assist users in making agriculture management decisions based on real-time weather data.

- Results of applied research led to increases in IPM practices and/or reductions in pesticide use. Example: an ongoing stone fruit disease survey did not yield brown rot, allowing growers to forgo fungicide sprays previously applied for the pest.
- Efforts made to reduce unnecessary pesticide use by increasing awareness and recognition of beneficial insects and cultural controls as key components of IPM programs. Activities included a series of organic IPM farm walks, hands-on IPM evening classes during summer months, and school IPM outreach.
- In-person, phone, and email surveys conducted to determine distribution and abundance of invasive weeds. Collected data used to develop weed distribution and abundance maps, a preliminary watch list of potential new invaders, and a full-color poster highlighting priority species for individual counties.
- Extension effort addressed top-ranking insect pest concerns of homeowners by conducting outreach that combined new print and online IPM resource materials with local delivery of on-site IPM workshops, particularly training for Master Gardeners.

Work Groups

Western IPM Center Sponsors Five Work Groups

In 2011, Western IPM Center funding supported five issue-based work groups involving:

- Crop pest losses and impact assessment in Arizona and California cotton, melons, and other crops
Principal Investigator: Al Fournier, University of Arizona, fournier@ag.arizona.edu
- Functional agricultural biodiversity group that focuses on conservation biological control
PI: Gwendolyn Ellen, Oregon State University, gwendolyn@science.oregonstate.edu
- Improving collaboration and early detection of and response to noxious weeds in southeastern Arizona and southwestern New Mexico
PI: Kim McReynolds, University of Arizona, kimm@cals.arizona.edu
- Management of choke disease in the western region
PI: Sujaya Rao, Oregon State University, sujaya@oregonstate.edu
- Western region school IPM implementation and assessment
PI: Tim Stock, Oregon State University, stockt@science.oregonstate.edu

Forest and Kim Starr, Starr
Environmental, Bugwood.org



See the "Center Projects" section of the Western IPM Center Web site, <http://www.wripmc.org>, for objectives and expected outcomes of these work groups.

Center Staff



Rick Melnicoe

Rick Melnicoe, active in pest management issues for more than 30 years, serves as the director of the Western IPM Center (WIPMC), headquartered at Meyer Hall, University of California, Davis.

Co-director is entomologist Tom Holtzer, department head of Bioagricultural Sciences and Pest Management at Colorado State University, Fort Collins, and associate director is Linda Herbst of UC Davis. Diane Clarke of UC Davis serves as writer/editor.



Tom Holtzer

The WIPMC 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.

The WIPMC serves as an IPM information source, designed to quickly respond to information needs of the public and private sectors.

Contracted WIPMC staff includes regional comment coordinators located throughout the region and an IPM regional grants manager.



Linda Herbst



Diane Clarke



Leveraging

Competitive grants provided through the Western IPM Center yield data and results that have then been used in acquiring additional funding for 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. Since 2004, Center funding has resulted in more than **\$16.7 million** in leveraged funds, representing an overall return of **\$10 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.

Rate of Return: \$5 for every \$1 awarded

Work Groups

Leveraged funds resulting from WIPMC-funded work groups have totaled more than **\$6.6 million**.

Rate of Return: \$22 for every \$1 awarded

Special Projects

WIPMC funding in the Special Projects grants program has leveraged **\$792,000**.

Rate of Return: \$14 for every \$1 awarded

Addressing Western IPM Issues

Funding leveraged through WIPMC-funded "Addressing Western IPM Issues" grants has totaled more than **\$7.2 million**.

Rate of Return: \$8 for every \$1 awarded

Visit the Western IPM Center Web site, <http://www.wripmc.org>, to download a one-page flyer detailing the granting organizations that awarded this additional funding.

Work Group Impacts

Crop Pest Losses and Impact Assessment

Through this project, focused in the low deserts of Arizona and the Imperial Valley of California, work group members develop accurate, “real-world” data on crop pest losses, control costs, target pests, and pesticide use through face-to-face workshops in an interactive survey process that encourages and rewards stakeholder input. Growers, pest control advisors (PCAs), Extension personnel, and industry professionals attend workshops to complete the survey and are offered incentives to offset the costs of participation. This face-to-face approach results in improved response rates, a more representative and better quality set of data, education of all those involved, and collaborative partnership with key stakeholder groups. As necessary, work group members conduct follow-up mail surveys with key PCAs to ensure good representation of region-wide acres in the final data sets.

Work group collaborators currently collect data for cotton, cantaloupes, watermelons and head lettuce. In addition to insect information, crop pest losses surveys collect detailed data on weed losses and management (all crops) and disease losses and management (lettuce and melons). Collaboration with additional scientists to develop this aspect of the data has been successful and will continue.

What makes these data unique with respect to pesticide (and IPM) policy is that stakeholders are asked to identify the specific intent or intended target or targets of their management decisions and inputs. So in addition to rich quantitative data, work group members also have

unique qualitative insights into the decision-making experience of pest managers. These insights help guide existing and new programs of IPM research, implementation, and outreach.

Benefits of Workshops and Data

Responding to Emerging Pest Issues. The face-to-face workshops serve as an important focal point for discussion about shifting pest management needs, emerging pest issues, and IPM program emphases. For example, in 2011, work group member John Palumbo collected important information from PCAs about bagrada bug infestation levels and insecticides used to control it in cole crops. The bagrada bug is a new invasive pest of Arizona cole crops. Work group members were able to quickly evaluate the impact of this new invasive insect pest on broccoli yields, quality, and insecticide use. This information formed the basis for developing a response plan for this new pest.

Responding to Information Requests and Serving Local and Regional Needs. Data generated through the workshops are useful for responding to pesticide information requests by EPA and USDA and can provide a basis for regulatory processes such as Section 18 or 24(c) requests, as well as for evaluating the impact of extension programs on risk reduction to growers. The data have also served local and regional needs, including a recent economic analysis for the Arizona Cotton Growers Association of the value of Bt cotton in Arizona markets.

Educational Uses. Data generated by the work group are frequently presented to educate growers, PCAs, and others about desert pest management and the impact of key insect pests, weeds, and diseases and their control strategies on yield and profit. In particular, annual cotton pest losses data, which is available for the longest span, is used to show dramatic impacts of evolving IPM strategies on pesticide use, grower profits, and the environment. Work group collaborators have developed and analyzed crop pest losses data and developed graphics and used them in presentations and publications to educate stakeholders about crop pest losses and the impact of IPM programs and pest management technologies.



Gary Kramer, USDA-NRCS

Documented Impacts

Through the Crop Pest Losses data, group participants have been able to document that:

- Statewide averages for cotton insecticide use patterns in Arizona from 1979 through 2010 show that insecticide use on cotton for all insects combined—including whiteflies, pink bollworm, Lygus bug and others—reached a 32-year low over the last 5 years, while also reducing costs to all-time lows. The estimated cumulative savings in control costs and yield (from reduced losses to insects) from 1996 through 2010 was more than \$223 million.
- This record low insecticide use on cotton during the last 5 years (just 1.5 sprays season-long) reduced insecticide loads on the environment by more than 1.6 million pounds of active ingredient annually and saved growers more than \$10 million annually in combined control costs and yield savings.
- Results from 6 years of Lettuce Pest Losses surveys show that 1) costs associated with spray applications and management fees have increased steadily, 2) western flower thrips has become an important economic pest in both fall and spring lettuce, and 3) the use of older, broadly toxic insecticides has dropped significantly, whereas use of the newer, softer reduced-risk chemistries continues to increase.

An understanding of the impact of key insect pests, weeds, and diseases on crop yield, expense of control, and pesticide use provides a basis for evaluating research and education priorities. These data help work group members to evaluate adoption and impact of IPM programs and focus attention on the major issues that impact growers.

Visit <http://www.wripmc.org> for further information about WIPMC-funded work groups.

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For more information on the Western Integrated Pest Management Center, see

<http://www.wripmc.org>

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