2010 Annual Report

Western Integrated Pest Management Center

WIPMC

Director's Comments

This is the sixth annual report of the Western Integrated Pest Management (IPM) Center. During the past year the Center has received continuation funding for the final year of our current 4-year grant; continued the management of 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 research and extension projects, work groups, publications and outreach materials, surveys, crop profiles, 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 Integrated Pest Management*, 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 the "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.

Cover Photos:
Small: Drip irrigation in a Utah garden. *Photo by Ron Nichols, USDA-Natural Resources Conservation Service*
Large: Handline sprinkler irrigation germinating crops in Yuma, Arizona. *Photo by Jeff Vanuga, USDA-NRCS*

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.

Epidemiology and Integrated Management of the Cucurbit Yellow Stunting Disorder Virus in Sonoran Desert Cucurbits

Principal Investigator: Judith Brown, University of Arizona

(Photo by John Palumbo, University of Arizona/Yuma Cooperative Extension)

Summary: Mixed melon and other cucurbits are major commodities in the Sonoran Desert. In fall 2006, a new disease reached pandemic proportions in the cucurbit-producing areas of Arizona, California, and Sonora, Mexico, resulting in losses greater $14 million to Arizona fall melon production alone, and an estimated 60 to 70 percent reduction in marketable melon yield in Arizona, California, and Sonora. The causative agent was identified as cucurbit yellow stunting disorder virus (CYSDV), a whitefly-transmitted virus that causes yellowing of the leaves between the veins, shortened stems between the nodes, leaf brittleness, and reduced sugar content.

The project's overall goal was to assess regional prevalence of CYSDV and develop a region-wide program to minimize losses and achieve sustainable cucurbit production. Specific objectives were to 1) determine the distribution of CYSDV in a) cucurbit and non-cucurbit crops and b) desert weeds in order to clarify the disease cycle and identify over-seasoning hosts in local production areas; 2) determine the experimental host range of CYSDV; 3) develop chemical and cultural control management practices to reduce regional whitefly and CYSDV pressures; 4) screen promising melon germplasm for CYSDV resistance under natural infection conditions in Arizona and California study areas; and 5) establish a regional education and management program for Arizona and California producers to encourage implementation of best practices.

Results: Researchers determined that the best management practices included a voluntary melon/watermelon host-free period to abate early season fall CYSDV outbreaks and subsequent virus overwintering; seasonal monitoring of whitefly and virus prevalence to better time pesticide applications; encouraging managers to respond to virus survey/whitefly sticky trap information by applying pesticides when whiteflies disperse to melon fields; implementing best practices pesticide regimes; and continuing the development of CYSDV-resistant germplasm. Numerous research updates were presented at extension-sponsored educational meetings, a CYSDV bulletin was produced and distributed in Arizona, and information was posted at the UC Statewide IPM Program Web site. Task force and Melon Board meetings were held several times a year to provide producers and field managers with the most up-to-date information. Researchers presented abstracts at professional meetings, and refereed journal articles were published on the topic.

Impacts and Potential Impacts: In Arizona the first Melon Task Force, comprised of producers, field managers, University of Arizona (UA) Extension personnel, and UA researchers, was established to solve a common problem and save the melon industry. The California Melon Board supported research in Arizona and California, furthering the regional effort to manage the disease based on knowledge. Based on growing recognition of the symptoms of CYSDV and accurate identification of the disease, producers and field managers were able to plant more tolerant melon and watermelon varieties, reducing lost profits. Interest was strengthened in continuing research to identify important over-seasoning virus and whitefly reservoirs throughout the region. As a result of regional outreach, producers and field managers are more aware of how their practices affect others. Knowledge-based research has given producers and field managers facts upon which to base their actions and management strategies. Progress has been made toward identifying several CYSDV-tolerant accessions.

Economic Analysis of Host-Based Ectoparasite Control

PI: Bradley Mullens, University of California, Riverside

(Photo by Bradley Mullens, University of California, Riverside)

Summary: Almost all commercial laying hens are kept in groups in wire cages. Close proximity encourages spread of the northern fowl mite, *Ornithonyssus sylviarium,* and the chicken body louse, *Menacanthus stramineus,* the two key poultry ectoparasites (parasites that live on the surface of the host). The northern fowl mite ranks as the top ectoparasite concern in laying hens. Mites and lice damage production and bother workers. Once birds are infested, producers depend exclusively on pesticides for control, and resistance is a serious issue. In addition, animal welfare issues in poultry systems have recently received significant attention, and one of the issues is beak trimming, done to prevent pecking damage and reduce feed waste. Nearly all egg production is from beak-trimmed hens. Beak-intact hen ectoparasite populations are far lower due to better hen grooming. Project researchers conducted experiments to quantify hen grooming behavior and to determine whether hens with intact beaks could control mite and louse populations well enough to prevent economic damage. Project objectives were to 1) determine the economics of production for beak-trimmed and beak-intact hens challenged with either northern fowl mites or body lice; 2) determine interactions of ectoparasite grooming behavior with beak condition and age of beak trimming; and 3) inform the industry of the potential benefits of using beak-intact hens for eliminating worker pesticide exposure, reducing or eliminating worker nuisance concerns, eliminating ectoparasite control concerns in an economic sense, and perhaps reducing animal welfare concerns and criticism.

Results: *Objective 1:* Three complete trials were done using a docile hen strain (Hyline W-36). Trials differed somewhat in overall results. In trial 1, uninfested, beak-intact controls were 17 cents more profitable (per hen) than uninfested, trimmed hens. In trial 2, this advantage was 20 cents per hen, but in trial 3 it was negligible. Louse damage was slight to negligible in intact hens in all three trials. Mite damage in intact hens was not seen in trial 1 and was slight to moderate in trials 2 and 3 (17 and 5 cents per hen, respectively). Trimmed hens sustained damage from lice and especially mites in most trials. *Objective 2:* Louse-infested hens spend more time grooming. Among intact hens, louse-infested hens spent about 30 percent more time grooming than uninfested hens. But among trimmed hens, infested hens (with far higher louse loads) groomed drastically more (about 400%) than their uninfested counterparts. *Objective 3:* Researchers presented the project's results at two state UC Cooperative Extension poultry producer meetings.

Impacts and Potential Impacts: Producers and the scientific community have been made explicitly aware of the commanding role of beak condition in ectoparasite control. The project's findings have high potential to influence how hens are managed, and certainly how ectoparasites are managed. Data thus far indicate that use of beak-intact hens greatly reduces parasite numbers and mitigates mite and louse damage to egg-laying hens, probably to below the level requiring control in most situations. The reduction in pest numbers alone likely will eliminate worker complaints, a primary reason that producers apply pesticide treatments. The demonstration that pest-driven economic losses are also much lower in intact hens should get people thinking about development of more docile strains and resulting advantages of using beak-intact hens.

Plant Inventory and Survey Methods for Land Managers: A Web Seminar Series

PIs: Elizabeth Galli-Noble and Mary McFadzen, Center for Invasive Plant Management, Montana State University

Summary: Locating and mapping the presence and absence of invasive plant populations provides essential information for developing effective IPM strategies. Land managers use this

(Photo by Steve Dewey, Utah State University, Bugwood.org)

information in prioritizing their efforts and developing strategies for prevention, early detection/rapid response, monitoring, and control. Many land managers in the West manage invasive plants over very large areas of forest and range, so they need efficient and cost-effective inventory and survey methods that are appropriate for large landscapes.

The project's overall goal was to inform land managers about invasive plant inventory and survey methods suitable for large tracts of land, providing knowledge to help in early detection/rapid response and management efforts. Specific objectives were to 1) provide an effective online learning environment where geographically dispersed land managers could engage in dialogue with scientists and peers and learn more about inventory and survey methods and how the appropriate method can help achieve IPM objectives; 2) identify knowledge gaps and needs that affect implementation of inventory and survey methods for early detection/rapid response and management, and for other components of IPM; and 3) increase the dissemination of information on inventory and survey methods by making the recorded seminars available on the Web.

Results: A series of six interactive Web seminars was developed on invasive plant inventory and survey methods. A total of 1,468 people from 45 states, seven Canadian provinces, Portugal, and South Africa participated in the seminars. Participant evaluation responses indicated that the seminars were very well received. All presenters compiled a list of resources relevant to their topics, which were available for downloading during the Web seminars. Knowledge gaps indicated by participants included a variety of topics from measuring the effectiveness of a plan (highest scored topic) to developing goals and objectives (lowest scored topic). Recordings of the Web seminars and the presentation slides were posted on the Center for Invasive Plant Management Web site and advertised.

Impacts and Potential Impacts: Land managers are more knowledgeable about invasive plant inventory/survey methods. This knowledge enables them to conduct more informed planning and assessment of inventory/survey methods, which may help achieve overall management objectives and goals. Identification of knowledge gaps provides valuable information for development of future educational opportunities for land managers. Land managers may have an increased probability of detecting new invasive plant populations before they become large, thereby minimizing the use of chemical herbicides, associated costs, and nontarget impacts. They may also be more interested in developing or refining an invasive plant or IPM plan for guiding and assessing their management decisions. Land managers who did not attend the Web seminar series now have access to a high-quality online resource for learning about inventory/survey methods.

Process-Based Modeling of Ecological Thresholds: Managing *Bromus tectorum* Invaded Communities

PIs: Cynthia Brown, Michael Coughenour, and Leonard Roy Roath, Colorado State University

(Photo by Marques Munis, Colorado State University)

Summary: *Bromus tectorum* (cheatgrass) is one of the most widespread invasive weeds on rangelands of western states. *Bromus* increases fire frequency and intensity, eliminating shrubs and perennial grasses that are critical winter forage for wildlife; decreases wildlife and livestock habitat value and limits use of prescribed fire as a management tool; and changes fundamental ecosystem processes by altering nitrogen dynamics and composition of microbial communities. Changes in ecosystem function can cause a breach of ecological thresholds (i.e., changes in ecosystem processes occurring to the point that historical conditions cannot be restored without major inputs). To avoid such transitions, ecosystem process changes must be arrested early. This idea of ecological thresholds has been integrated with economic thresholds in cropping systems to help guide management decisions.

This project used a combination of process-based simulation modeling and field experiments to evaluate chemical control, seeding, and grazing to offset the effects of *Bromus* invasion under different fire histories. Project objectives were to 1) model impacts of *Bromus* invasion under an array of IPM and environmental conditions in the Southern Rocky Mountain ecoregion by adapting SAVANNA, a spatially-explicit process-based model (i.e., able to model interactions of multiple ecosystem processes over time, rather than modeling a static point in time); 2) measure effects of fire and IPM practices on *Bromus* and the native plant community, and generate data vital to the accurate parameterization of the SAVANNA model; 3) produce invasion risk assessment maps for *Bromus* in the Southern Rocky Mountain ecoregion; 4) publish findings in a peer-reviewed journal article and report results in a format accessible to managers on a Web site; and 5) conduct a workshop for extension agents, land managers, and the interdisciplinary research team to present project findings, get feedback on the project Web site, and develop the foundation of a decision support tool for managers.

Results: *Objective 1:* A conceptual model was developed for *Bromus* invasion and persistence, driven by soil texture, organic matter content, nitrogen cycling, perennial plant cover, timing and amount of precipitation, and frequency and intensity of disturbance. *Objective 2:* Data were collected to evaluate the effects of imazapic and seeding on plant community composition. Researchers also collected various types of carbon and nitrogen data. An innovative photographic method was used in the second year to estimate plant cover by functional group. *Objective 3:* Invasion risk assessment maps will be completed through additional funding. *Objective 4:* Researchers continue to develop manuscripts for submission to professional journals. Outreach publication is still under way. The Web site was developed, and researchers continue to develop and add content. *Objective 5:* A day-long workshop (with 22 participants) was conducted in 2009 in Cheyenne, Wyoming.

Impacts and Potential Impacts: The use of linked economic and ecological models to inform on-the-ground decisions for integrated use of grazing, herbicides, and restoration for invasive plant management is novel, and researchers expect it will greatly improve management efficiency. These models will make it easier to identify the most effective management actions within economic constraints, and to identify efficacy thresholds for different management methods. These tools have the potential to be useful on hundreds of thousands of hectares of land currently invaded or at risk of invasion by *Bromus*. Pesticide use will be minimized by applying herbicides only when they will be most effective, safeguarding human and environmental health. This research will help managers identify when it is warranted to incur the expense of various management activities.

Wheat Seed Quality Effects on Competitive Ability with Wild Oat

PIs: Robert Stougaard and Qingwu Xue, Montana State University, Bozeman; Joe Yenish and John Burns, Washington State University, Pullman

(Photo by Steve Dewey, Utah State University, Bugwood.org)

Summary: Weeds represent one of the most significant barriers to sustainable farm profits, and in cereal-based cropping systems, wild oat (*Avena fatua*) is one of the greatest concerns. Wild oat management systems have evolved to the point that producers rely on herbicides to the virtual exclusion of all other strategies. While generally effective, herbicide use erodes profits and poses environmental concerns. Moreover, despite the intensive use of herbicides, wild oat populations continue to persist. Wild oat seed dormancy and variable herbicide efficacy contribute to this problem.

However, this situation is worsened by the widespread occurrence of herbicide-resistant biotypes. A strict reliance on herbicides for wild oat management has not been sufficient. Investigators have pursued development of integrated weed management systems that shift the focus to the crop rather than the weed and emphasize improving crop competitive ability. This project evaluates the interactive effects of seed size, protein content, and gibberellic acid (GA, a plant hormone) seed treatments on spring wheat's ability to compete against wild oat. All three factors contribute to enhanced wheat emergence, seedling vigor, and developmental rates. Investigators hypothesized that their integration would enhance their individual attributes, stabilize their cumulative impact on wild oat, and provide for a more durable weed management system. Investigators added suppressive rates of herbicides to enhance the cumulative effect on the weed. Specific project objectives were to 1) determine the interactive effects of seed size, protein content, and GA seed treatments on spring wheat competitive ability for the suppression of wild oat; and 2) determine to what extent seed quality factors influence the effects of variable tralkoxydim (an herbicide) rates on wild oat control, wheat yield, and economic returns.

Results: The study results demonstrated that improved spring wheat seed quality significantly increases crop competitive ability and improves weed control. Seed size appears to be the most important factor, having affected all of the early growth traits. Plants established from large seed had improved stands and more vigorous growth. Protein content also had a positive impact on crop competitive ability. However, the effect of seed protein was less consistent and may vary depending on soil nitrogen concentrations and wheat market class. With the exception of a slight effect on seedling emergence, plant hormone seed treatments did not appear to have any beneficial effect on crop competitive ability. Nonetheless, the overall results demonstrate that wheat seed quality can be manipulated to favor the crop over the weed.

Impacts and Potential Impacts: As wheat seed quality is manipulated, the resultant improvement in competitive ability improves weed control, reducing yield losses and dockage penalties (reductions in price due to deficiencies in quality) in the process. This technology correspondingly improves herbicide efficacy. In turn, this could reduce herbicide input costs and environmental contamination and could slow the development of herbicide resistance. The associations between these seed quality factors and competitive ability could ultimately be used to initiate a breeding program directed toward developing competitive small grain varieties.

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 two of these small grants (up to $5,000 each) are summarized below:

Preventing Ticks on Pets to Reduce Incidence of Rocky Mountain Spotted Fever

(Photo by Alex Pauvolid-Corrêa, Fundação Oswaldo Cruz, Bugwood.org)

The brown dog tick is a host of Rocky Mountain spotted fever, a potentially fatal illness. The transference of the host tick to household dogs, and then to humans, caused 60 cases of the disease in eastern Arizona during the period 2003 to 2008, with six fatalities on the San Carlos and White Mountain Apache reservations. Investigators distributed educational flyers and tick-prevention dog collars at clinics and through home visits on the reservations and demonstrated how to keep homes and pets free of ticks. Health personnel, veterinary students, and volunteers provided numerous tick-prevention demonstrations at two spay and neuter clinics and two rabies clinics as well as during household visits on each reservation. With more access to educational materials on tick prevention and sample dog collars, reservation residents were more likely to control ticks around their residences and on their pets. If more residents adopt the tick-prevention strategies, the incidence of Rocky Mountain spotted fever cases and fatalities will decrease, leaving healthy pets and homes and a healthier community.

Development of Acoustic Methods for Detecting Coconut Rhinoceros Beetles on Guam

Entomologists at the USDA-Agricultural Research Service Center for Medical, Agricultural, and Veterinary Entomology, and at the University of Guam collected and analyzed sounds produced by the coconut rhinoceros beetle in palm trees in Guam. This beetle recently invaded Guam, and the adults cause great economic damage and can kill coconut palms. The beetles are difficult to find visually, because they attack the tops of the trees. This study demonstrated, however, that their movement and feeding sounds can be detected over long distances in a tree, and that acoustic sensors could be used to detect hidden infestations and distinguish these insects from others commonly found in palms. Acoustic sensors are now being used in the program to eradicate the coconut rhinoceros beetle. Coconut palms found to be infested are being removed or treated with insecticide. Acoustic detection may be a key technology enabling eradication of the coconut rhinoceros beetle from Guam.

See the final reports for these projects at **http://www.wripmc.org/centerprojects/specialprojects.html.**

Addressing Western IPM Issues

Newly-Funded Projects

The Western IPM Center funded four "Addressing Western IPM Issues" projects, totaling $113,914 in the fall of 2009.

- Outreach to Preserve Pheromone Mating Disruption Programs in California and Oregon Pear Orchards
  Principal Investigators: Rachel Elkins and Kris Lynn-Patterson, University of California; Richard Hilton and Philip VanBuskirk, Oregon State University
- Developing and Delivering an IPM Program for Mountain Pine Beetles Attacking High Value Urban Trees
  PIs: Kevin Wanner, Montana State University; Leslie Koch, Wyoming State Forestry Division
- Pre- and Post-Harvest Drenches Containing Essential Oils to Control Eggs of Pest Slugs and Snails in the Growing Medium of Potted Plants
  PIs: Robert G. Hollingsworth, U.S. Pacific Basin Agricultural Research Center; Rory McDonnell and Timothy Paine, University of California
- Polk County Nutria Control Research Project
  PI: Jackie Hastings, Polk Soil and Water Conservation District, Oregon

(Photo by John and Karen Hollingsworth, US Fish and Wildlife Service, Bugwood.org)

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.

Symposium on IPM and Water Quality Lays Groundwork for New Regional Collaborations

A Western IPM Center cosponsored symposium—"Investigating the Connections between IPM and Water Quality," held on April 13, 2010 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 education, extension, and research group in the West. 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; 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.

(Photo courtesy of USDA-NRCS)

Supporters of the resulting funding proposal, which is under review, include educators and researchers at land grant institutions in Alaska, California, Idaho, Nevada, Oregon, Washington, and Wyoming, as well as personnel at the Natural Resources Conservation Service, state water boards, the California Department of Pesticide Regulation, state Environmental Protection Agencies, state Departments of Agriculture, soil conservation districts, non-land-grant colleges and universities, pesticide industry personnel, environmental groups, and commodity groups. The focus of the proposed work group will be multidisciplinary collaboration on best management practices to reduce pesticide impacts on water quality in urban, agricultural, and natural resources settings in the western region. Work group members will collaborate to determine specific needs in the region, harness capabilities, identify resources, and implement projects. Expected outcomes and impacts of these collaborations include new multidisciplinary approaches to specific water quality challenges in the West; increased adoption and use of IPM as an effective BMP for water quality by farmers, ranchers, institutions and municipalities, range managers, custodians of natural areas, landscape professionals, homeowners, and others; reduced detections of pesticides in western region waters; and improved food and water security in the West.

IPM Scouting Manual for Pacific Northwest Potato Production Published in English and Spanish, Soon to be Published in Russian

The *Field Guide to Potato Pests in English and Spanish* (a pocket-sized guide) was designed to fill unmet pest management needs in Pacific Northwest potato production. Prior to the manual's production there were no potato IPM manuals specifically directed for field scouting, nor were there any such manuals in Spanish. The project, funded by the Western IPM Center and developed utilizing experts throughout the Pacific Northwest, has provided a valuable IPM resource for an underserved population in the Pacific Northwest. The manual's heavy use of graphics, very clear color photos depicting pests at various stages of growth, and drawings of weed characteristics, make it easier to use for those with a language and/or reading barrier. In addition, the manual describes (both graphically and descriptively) the crop stage at which scouts should look for each key pest.

The manual was developed by determining the key potato pests and what crop stage they are economically important or may be discovered by field scouting. The Pest Management Strategic Plan for Pacific Northwest Potato Production was utilized for this, ensuring that the manual's contents would be based on broad stakeholder input. Training was given to Spanish-speaking farm workers and farm managers of the larger potato farms in Idaho. Approximately 100 Spanish-speaking farm workers and farm managers have been trained. The idea of targeting Spanish speakers for scouting purposes has been successful, and there has been a large demand for copies of the manual for farmers to use with their Spanish-speaking crews. It is expected that early pest identification by Spanish-speaking field crews will increase the use of IPM and reduce pesticide use in potatoes.

Co-principal investigator on this project, Ronda Hirnyck, University of Idaho, has received further funding from the Center to create an additional potato IPM scouting manual for Alaska, in English and Russian, the language of Alaska's primary farm labor force.

Regional IPM Centers Partner with HUD to Promote IPM Practices in Public Housing Authority Living Units

Western IPM Center Associate Director Linda Herbst was on site at the San Francisco Housing Authority's Sunnydale Development in May for a day of IPM training at the development. The training is part of an outreach project jointly funded by USDA and the U.S. Department of Housing and Urban Development (HUD). This project is coordinated by Allison Taisey at the Northeastern IPM Center, but all of the Regional IPM Centers have had an advisory role. To participate, public housing authorities (PHAs) agree to implement IPM for one year in return for receiving a one-day IPM training for residents, staff, and local organizations who will partner with the PHA to support their IPM implementation.

Dave Hickok, King County, Washington, Public Health Department, and Dawn Gouge, University of Arizona, delivered the training at the Sunnydale Development in San Francisco. The 752-unit family development was chosen as the pilot site for the training because of high incidences of asthma in the community. Cockroaches can trigger asthma in preschool-aged children. By practicing IPM, the housing authority staff hope to reduce cockroaches and thus incidences of asthma. This training was noteworthy because of the diverse groups that came together to learn about IPM. Representatives from Breathe Easy California, Californians for Pesticide Reform, the San Francisco Department of Public Health, BayLegal, the Western IPM Center, the San Francisco Department of the Environment, and the Housing Rights Committee of San Francisco all attended the training with Sunnydale staff. Going forward, these groups have offered to help the property manager with resident education and support.

Trainings were also held at PHAs in Hawaii and on Guam, with each training curriculum tailored to the individual site. The Hawaii training yielded additional funding from the Hawaii Department of Health's Asthma Control Program for follow-up outreach to encourage implementation of IPM among the housing development's residents. The project has also developed a briefing DVD and IPM kit for residents. The DVD contains a short training intended for residents during their orientation to the PHA, and after watching the DVD each resident is given an IPM kit that introduces them to the way pests are managed in their building. The kit includes the basics of pest biology and behavior, who is on the IPM team for their development, and how they can use their knowledge and the tools given to manage pests.

(Photo by Allison Taisey)

This multi-agency outreach meets the needs of an underserved audience for IPM awareness and training and has the potential to reduce human exposure to pesticides, especially among children. Nationwide, nearly 400 people have attended the training.

The training materials used in this project, along with additional project details, are available at ***www.stoppests.org***.

Work Groups

Western IPM Center Sponsors Three Work Groups

In 2010, Western IPM Center funding supported three 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***
- Combating the spread of noxious, invasive weeds on public, state trust, and private lands in southeastern Arizona and southwestern New Mexico
  PI: Kim McReynolds, University of Arizona, ***kimm@cals.arizona.edu***
- Development of integrated vegetation management research and demonstration projects on western rights-of-way
  PI: Jack McCabe, Utility Arborist Association (UAA) Director and Operations Manager for Davey Resource Group, California, ***jack.mccabe@davey.com***

(Photo by Tim McCabe, USDA-NRCS)

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

Tom Holtzer

Linda Herbst

Diane Clarke

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.

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.

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 million** in leveraged funds, representing an overall return of more than a **$9 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 **$6.2 million**.

Rate of Return: **$20 for every $1 awarded**

Special Projects

WIPMC funding in the Special Projects grants program has leveraged **$643,000**.

Rate of Return: **$13 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

Using face-to-face workshops and an interactive survey process that encourages and rewards stakeholder input, investigators develop accurate, "real-world" data on crop pest losses, control costs, target pests, and pesticide use. Data are currently collected for cotton, cantaloupes, watermelons, and head lettuce, and the project is focused in the low deserts of Arizona and Imperial Valley, California. Growers, pest control advisors, Extension personnel, and industry professionals attend the workshops to complete the survey are offered incentives to offset the costs of participation. This face-to-face approach has resulted in improved response rates, a more representative and better-quality set of data, education of all those involved, and collaborative partnerships with key stakeholder groups. The data are useful for responding to pesticide information requests generated 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 offered to growers.

Stakeholders are asked to identify the specific intent or intended target or targets of their management decisions and inputs. So in addition to the rich quantitative data collected, investigators also have unique qualitative insights into the decision-making experience of the pest manager. These insights help guide existing and new programs of research, implementation, and IPM outreach. Through this data source alone investigators have been able to document that:

- 2006 and 2007 had the lowest foliar insecticide use in cotton on record in Arizona. (Records began in 1979.)
- 2007 had the lowest grower costs for foliar insecticides in cotton.
- 2008 was the first year since 1965 that cotton growers have not deployed insecticides to control pink bollworm statewide.

(Photo by Gary Kramer, USDA NRCS)

Western Region School IPM Implementation and Assessment

Established in 2007, this work group's purpose is to foster collaboration among universities, state agencies, federal agencies, industry, and advocacy groups working to encourage and enhance successful implementation of IPM in schools in the western region. To accomplish this, the group developed an inventory of programs and resources, worked to increase networking and communication and improve access to and sharing of resources, and identified IPM implementation challenges and barriers. The group developed a school IPM (sIPM) assessment tool, completed a state-by-state inventory of sIPM resources among nine represented states, and succeeded in establishing productive collaborations among previously isolated programs. Membership has continued to increase, and almost all states in the western region are now represented. Conference calls, personal communications, and regular emails have facilitated discussions on future collaborative efforts and potential funding opportunities and fostered partnerships among emerging and ongoing sIPM efforts. Impacts and potential impacts include:

- School districts increasing their adoption of lower risk pesticides and precision application technology and equipment
- Schools providing/increasing staff training in implementing IPM tactics
- An increase in the number of schools, districts, and agencies that implement IPM plans
- A reduction in exposure of children and others to pests and unnecessary pesticides in schools, improving health and the learning environment
- Schools using cost- effective IPM practices

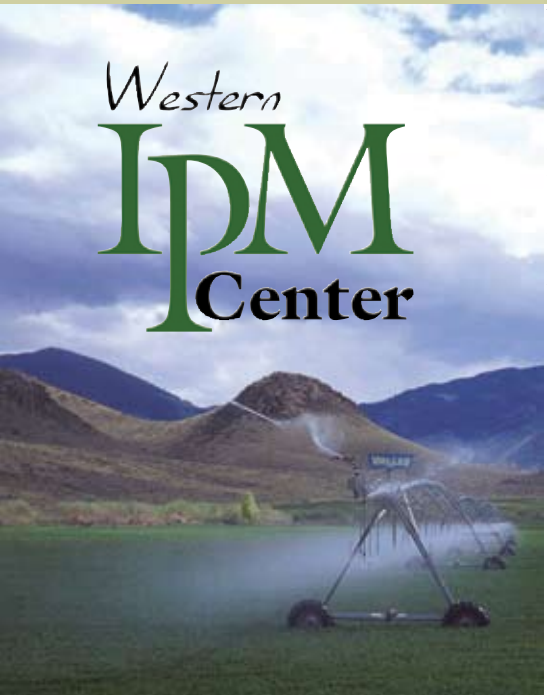
Since 2007, the group has received $350,000 in additional funds from EPA and USDA, significantly leveraging the $30,000 in support provided by the WIPMC.

(Photo courtesy of USDA NRCS)

Western IPM Center Work Group on Weather Systems

Encompassing climatologists, entomologists, meteorologists, plant pathologists, and economists, this group's purpose was to further science-based principles and procedures for the acquisition, utilization, analysis, and distribution of weather and climate data for IPM management decisions. Collaborators also aimed to increase user confidence and utilization of weather data and pest, disease, and crop phenology models to enhance IPM management decisions in crop, rangeland, forest, horticultural, and urban environments. Collaborative research that was a direct result of work group meetings has resulted in the implementation of interpolated weather forecasts, including a "virtual weather station" system that uses interpolated data. (Interpolation is a method of constructing new data points within the range of a known set of data points.) Improved weather analysis and forecast models resulting from work group activities were used to develop fire weather forecasts in 2008. Many of the activities of the work group have culminated in improved delivery of weather information at two Web portals, ***http://uspest.org/wea*** and ***http://weather.wsu.edu***. The latter provides data and analyses for the National Plant Diagnostic Network and presents data from more than 13,000 weather stations across the United States in a publically-accessible form. The work group is recognized as a leader in interpolation and delivery of weather, forecast, and pest model data; has set new standards and guidelines for weather-driven IPM; and has developed new methods for estimating parameters needed for pest models. Successful proposals by work group members have yielded more than $2.4 million in leveraged funding.

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



(Photo by Mark Olson, USDA NRCS)

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

http://www.wripmc.org

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