

# WERA-069 Annual Meeting

May 20 & 21, 2008

Chena Hot Springs, Alaska

(22 Participants/13 States and Territories Represented)

## *Meeting Minutes*

- **Opening remarks from UAF Interim Associate Provost/CES Director, Peter Pinney**
- **Marty Draper – CSREES Update.** Farm Bill has not passed through Congress or received President’s signature as yet, so the budget is still uncertain. Future grants for multi-state projects will require an increase from 25% to 70% participation to be considered for funding. **All Hatch funds to be moved into multi-state competitive funding. All Smith-Lever 3D funds to change into “Formula Grant Opportunity” with a yearly application needed for grant funding (this is a new change coming in FY 2009).** Information can be found at [www.grants.gov](http://www.grants.gov) - look at “formula funds” heading. eXtension has federal support and is expected to receive double the current funding. How IPM fits into this program is still a work in progress, with each state having its own specifics. Food & Agriculture Defense Initiative has funding for collaborative work with APHIS via the NPDN or WPDN network with infrastructure support. In the future, IPM must broaden out beyond crop systems to encompass “Community of Practice” for Horticulture Natural Systems and Animal systems (National Plant Management Systems). IPM Centers can apply for funds for specific problems (i.e. colony collapse disorder or new wheat rust disease) through Critical/Emerging needs for Pests & Disease, the funding is greater for emerging issues and can be used for research as well as action. There are NIPMU Proposal monies to assist in non-traditional systems for immediate needs (crops at risk), not long term monies. Apply for Risk Avoidance Mitigation for longer term funding. To show program accountability the formula funding agency people need to hear success stories. WERA069 success stories should be highlighted quarterly and passed up the chain highlighting what has been gained as a group via this collaboration. This could be done via one sheet, with a few stories in an electronic newsletter form (that could be printed) to be taken to the federal level for funders to take to Congress. CSREES would use IPM success stories, if agreed upon. The presentations from this WERA069 Annual Meeting should be posted on the WIPMC web site with a new WERA069 tab added to the site, this was originally stated in our plan of work, please send an electronic copy of your presentation to WIPMC.
- **Bernie Karl, co-owner of Chena Hot Spring gave an overview of geo-thermal energy efficiency utilized at the resort.**
- **Tom Holtzer - Administrative Advisor Report.** Annual Report needs to be filed within 60 days of this meeting. The Chair and Secretary should contact him for specific requirements. In addition to the Annual Report, WERA-69 is in its 3<sup>rd</sup>

year and thus there is a requirement for a midterm project review. Impact statements from the project are needed for the report. WERA-69 is doing a good job, keep it up.

- **Bill Coli – IPM Logic Model.** Bill gave an update on the National IPM Evaluation Working Group he chairs. This Group was formed to access and assist in the Plan of Work and Plan of Evaluation documentation for the IPM programs, not simply the activities but the outcomes. They have initiated the creation of a website to assist in development of standardized impact indicators for use as outlined in the national IPM Roadmap. It will be a toolbox for end-users, with IPM guidelines, protocols, adoption and impacts. This tool should help with the creation of success stories. We will need to work to assess impacts within Natural Resources Environments, i.e. national, state, county, parklands, BLM, NWR, DOT, golf course, play fields, impact areas. The National IPM Roadmap also has residential and public focus areas for community IPM. This website is currently being developed and Bill would like to hear from you if you have IPM guidelines in place. Pest Guidelines and PMSP's need to be submitted for inclusion in the national DRAFT version of the website, which is to be in place by September for end users interested in specific crop information. Bill Coli is asking for assistance by June 30<sup>th</sup> 2008 in supplying indicators for IPM Guidelines for creation of this website. The goal is to measure long-term impacts and outputs. A meeting later in the day was requested to receive a detailed outline of measurement plans and further discussion (shown later in the minutes).
- **Peter Ellsworth – Spatially Explicit Adoption of IPM Guidelines in Agricultural Landscapes.** Usage of neonicotinoids and how resistance develops in crops. Use of insect growth regulators or non-pyrethroid materials help in balancing resistance. Their research shows that multi crop areas can get by with fewer insecticides while a single crop requires constant or consistent use. Crop diversity and spatial relationships are being researched for commercial agriculture to assist in pest reduction and how best to utilize this information with changing products, registrations, formulations and regulations.
- **WIPM Center Update – Rick Melnicoe and Linda Herbst.** As of 2012 they will be retiring and will not seek additional grant funding. They would like new center leadership to take over in 2011 if program is to be continued or if this goes into the NRI. The WIPM Center newsletter is available on the website. Grant monies distributed to multi-state programs or projects can translate into other states, such as the WR Urban Ant workgroup. They are looking for feed back from this group for stakeholder requests. Grant money in future will be going into programs that are more generalized as opposed to specific crops, for example IPM in Schools. They would like to include weeds, more urban activities/Spanish language and workgroups and horticulture for grant opportunities as this is not just for commercial agriculture. Most of this grant proposal information is available on the website.
- **Joe DeFrancesco – Weather Data/Phenology Modeling Work.** Joe filled in for Paul Jepson. The presentation highlighted degree day models that can be used to predict insect stage development (relating to infestation outbreaks). Over 12,000 weather stations are providing input nationally. To assist with timing, product,

disease, insect, etc. for modeling risk. To view this model access at [www.pnwpest.org/wea](http://www.pnwpest.org/wea)

- **Bob Mahler - Proposed Western Region Water Quality/WIPM Center Program.** He would like to work specifically with WERA069 for common outputs. The water quality program is modeled after the EPA regions. We have many common environmental goals, but not duplication. Proposed a joint meeting in 2010 or 2011 to combine resources and exchange information between IPM and Water Resources Group for assessment outputs or joint symposium. He will host a conference call on June 18<sup>th</sup> for those interested in participation. The information for the conference call will be hosted by WIPM center. A workgroup for this concept could meet at the national IPM Symposium next year as a work session to discuss this collaboration for the coming years.
- **Corlene Rose – Alaska IPM Program.** Gave overview of Alaska’s IPM outreach education program, our unique working relationships with state agencies, our Invasive Plants Program and Citizens Workgroup.
- **State Updates** – Each participant gave brief overview of current programs in their state and area. A contact sheet is attached at the end of these minutes for all participants.
- **Alaska IPM Partnership Success Story comments and overview with Steve Patterson (USFS), Ann Ferguson (APHIS), Charlie Knight (Alaska Division of Agriculture).**
- **ARS Update – Alaska IPM Activities with Dennis Fielding and Lori Winton.**
- **WERA069 Awareness and Meeting the Mission – Tom Holtzer.** The Ag Experiment Station and Extension in each state are (ideally) each to provide one representative to this group. However, typically only the state IPM coordinators (which are Extension positions) participate. He would like to see more Ag Experiment Station involvement. The 2009 IPM Symposium in Portland would be a great place to involve more Ag Experiment Station representation. In order to comply with our reporting requirements we need a report from this meeting submitted in the next 60 days according to Multi-State Project procedures. The earlier the better, each participant should submit their report on outcomes, accomplishments and impacts as all need to be included. WERA Officers will then submit annual meeting reports in NIMSS. In addition, this is WERA-69’s 3<sup>rd</sup> year and an interim report must be filed. Impact statements are required for this 3<sup>rd</sup> year report. The 3<sup>rd</sup> year report needs to be filed by July 1<sup>st</sup> 2008.
- **Plans for 2009 Meeting and Beyond – Doug Walsh.** The next WERA069 meeting will be chaired by Doug Walsh and it will tentatively be held before the opening of the IPM Symposium in Portland. Details will be sent out in advance, please plan on participating.
- **Breakout Session on WERA Logic Model-IPM Roadmap.** Overview of charting Impacts to reduce pesticide movement offsite, this is an IPM roadmap statement for future use by EPA, NGO, Land grant agencies etc. Feedback necessary on this method for website development. Looking to document

decreased use/risk. NASS has pulled out of pesticide survey and the baseline data is 10 years old. This could be updated per crop (with grant writing) to include partnering with research or other entity. Standardized impact list utilized across commodities for reduced pesticide usage. Input is needed now or no whining allowed in future.

## **Accomplishments (Select Brief Statements from State Reports)**

### **Outputs**

#### ***Alaska***

The Alaska Integrated Pest Management (IPM) Program is a collaborative, grant funded, statewide outreach program – serving Alaskans for over 25 years. The AK IPM Program supports the CSREES IPM Roadmap and UAF-CES missions and goals through dissemination of knowledge, education and community service both statewide and regionally. A few examples include:

- Six funded seasonal IPM Pest Scout positions strategically placed statewide that address the following activities: Gypsy Moth & Exotic Lepidoptera monitoring; WPDN 1st Detectors; Amber-Marked Birch Leaf Miner Biological Control Project and WERA069 Program Participation
- Delivery of educational programs to disseminate research-based knowledge to 10,000-14,000 Alaskans annually, including: professional pest-control operators, home gardeners, commercial agriculture and horticulture clients, home & property owners, community groups & organizations, youth & volunteer groups, university departments and the general public
- Distribution of thousands of CES/UAF IPM-related publications annually
- Actively engaging the community with “multiplied” training (train-the-trainers) for community volunteers including: Master Gardeners, Community Tree Stewards, Youth Groups, and the Anchorage School District. IPM staff contribute and participate in classes, conferences and trainings with outreach at public events throughout the state;
- IPM staff serve Alaskans and promote Natural Sciences Education, with IPM staff serving on State of Alaska Community Forest Council and by distributing UAF admissions publications
- An Alaska IPM & Invasive Weeds Website was developed and brought on-line in FY 2007: <http://www.uaf.edu/ces/ipm/index.html> to further enhance our IPM outreach for Alaskan clientele.

#### ***American Samoa***

IPM efforts in 2007 focused on control of disease-carrying mosquitoes, identification of pest problems through the plant clinic service, monitoring for new occurrences of exotic pests, biological control, and introduction and promotion of disease-resistant taro and banana cultivars.

- In response to an outbreak of dengue fever, mosquito control information was disseminated by the college and local government agencies to the general public through television, newspaper, radio, and printed brochures. The control information could be tailored to the local environment and the locally important vector species as a result of IPM research conducted over the last several years with assistance of the U.S. Centers for Disease Control and Prevention and the American Samoa Department of Health.
- Plant clinic services assisted extension agents and residents with pest and disease diagnoses and control recommendations.
- A quarantine surveillance trapping program for exotic fruit flies continued in the territory—no exotic flies were found.
- At least two important new pest occurrences were detected, however. The Cuban slug, *Veronicella cubensis*, was found to have spread from Tutuila to Ta’u Island; and the cotton lace bug, *Corythucha gossypii*, was reported from Tutuila for the first time.
- Efforts continued towards finding a biological control solution to the Seychelles scale problem on Ta’u Island, and in evaluating efficacy of reduced-risk insecticides for vegetable pests.
- The tissue culture and plant pathology laboratories continued evaluation, selection, multiplication, and promotion of disease-resistant taro and banana varieties to improve food security and reduce fungicide inputs in production of these key dietary staples.

#### ***Arizona***

All IPM programs at the University of Arizona (UA) are organized within the Arizona Pest Management Center (APMC, <http://cals.arizona.edu/apmc/>), an umbrella organization directed by an IPM Coordinating Committee made up of UA faculty and stakeholders from across the state with expertise in entomology,

plant pathology and weed science. Within each focal area (Pest Detection & Diagnostics, Agricultural IPM, Community IPM, IPM Assessment, and Pesticide Education), program teams actively develop, manage, support and implement UA's IPM programs. The IPM Program Manager (faculty, 100% Extension) provides leadership and manages daily activities and communications. In FY 2007, 50% of the IPM Program Manager's salary was supported through Smith-Lever 3(d) funds and 50% through competitive grants. The activities of the APMC help keep our programs strategically focused, relevant to stakeholder needs, and well positioned to compete for IPM funding both regionally and nationally.

- The APMC coordinates an internal IPM grants program with 3(d) funds, to help support faculty IPM research and extension activities. 2007 projects (summarized on our website at <http://cals.arizona.edu/apmc/oldprojects.html#2007>) included seed funding for research on native and invasive pest management, support for stakeholder meetings and communication, IPM education and outreach, and a significant investment into IPM assessment. These projects are leveraged by state-funded working groups and by considerable external grants including APMC operations funds and stakeholder engagement projects through the Western IPM Center (WIPMC). We estimate total competitive funds generated through the APMC organizational structure now exceed \$3.5 million.
- The APMC facilitates stakeholder engagement of IPM clientele groups. In 2007, we were actively engaged in two Pest Management Strategic Plans (PMSP) funded in part through the WIPMC: a national PMSP for IPM in Schools (completed early 2008) and a Desert Cotton PMSP (in progress). PMSPs and other stakeholder discussions help us identify IPM priorities, develop collaborative solutions, and ensure transparency of our programs.
- A major focus of the APMC is IPM Assessment. In 2007 we further developed and refined a pesticide-use reporting (PUR) database and expanded our Crop Insect Losses and Impact Assessment program to collect "real world" pest management and economic data on some of our most important crops. These data sources are essential to tracking our progress in implementation of IPM and reduced-risk pest management strategies in agriculture, and also provide quantitative data for responding to Federal pesticide information requests, a program managed by the APMC and implemented through the Arid Southwest IPM Network ([http://ag.arizona.edu/apmc/Arid\\_SW\\_IPM.html](http://ag.arizona.edu/apmc/Arid_SW_IPM.html)), a multi-state network funded through the WIPMC.
- New activities for FY 2007 included a large regional geo-spatial sampling program for Lygus in cotton and surrounding communities and development of a multi-state evaluation of Lygus extension efforts (both linked to a USDA RAMP grant); sampling and research in response to a new disease threat in melons (Cucurbit Yellow Stunting Disorder Virus or CYSDV); hosting the 2007 WERA-069 IPM meeting; and developing plans for a Desert Turf PMSP in 2008

### ***California***

UC IPM continues to provide high quality, science based information to the citizens of California.

- A major accomplishment this year was the launch of our Urban and Community IPM Program and an expansion into a new IPM arena. This outreach provided IPM support to professional clientele including structural pest control operators, landscape maintenance professionals, and maintenance gardeners and many public agencies are involved in managing pests in public parks, golf courses, and buildings. Other groups include retail employees who sell pesticides, pet groomers, commercial building managers, schools, and day care centers. The program trains Master Gardeners, and supports UCCE Environmental Horticulture Advisors, through educational activities, expertise coordination and training. A major accomplishment was the development of IPM Kiosks that can be deployed at fairs, retail nurseries, libraries or CE offices. The kiosk is a self contained, touch screen computer that provides easy to understand IPM information for the home owner and can be printed as a "Quick Tip", a short concise abstract on specific pest management approaches.
- Research provides the engine of innovation and although funding for research has decreased in recent times, UC IPM continues to seek projects from campus researchers. Six research projects were funded in 2007 and a demonstration grants program initiated to encourage research/extension IPM linkages. The purpose of the Extension IPM Demonstration Grants Program is to demonstrate IPM practices and promote the implementation of IPM in production agriculture, and residential and urban areas, and to protect natural areas such as wild lands and water bodies. The primary focus is to increase adoption of IPM practices. Projects are expected to provide essential resources to Cooperative Extension advisors and specialists to strengthen the link between research and outreach. For 2007-08, the program funded seven demonstration projects.
- Educational and reference publications are a main stay of UC IPM. During 2007, a wide variety of print and web-based publications were developed including year-round IPM programs for apricot, avocado, citrus, pear, potato, strawberry, tomato, and walnut, bringing the total to 16. Pest Management Guidelines that were revised in 2007 include strawberries, avocado, potato, citrus, dry beans and tomato. UC IPM's contributions to IPM were recognized by the California Department of

Pesticide Regulation's IPM Innovator Awards for Almond IPM and Healthy Lawns and Gardens. UC IPM provided a comprehensive IPM training workshop for NRCS staff in support of the IPM & natural resource conservation program.

- Other highlights can be found at <http://www.ipm.ucdavis.edu/IPMPROJECT/2007/>.

### **Colorado**

Colorado State University is a leader in research on the ecology and biological control of invasive weeds and in IPM practices to reduce crop losses from insects, weeds and plant pathogens. Faculty in the department of Bioagricultural Sciences and Pest Management are currently training 46 Master's and Ph.D students in various aspects of IPM and pest ecology. CSU also has a strong outreach program and has initiated novel approaches to reach growers and IPM practitioners. It collaborates with public and private agencies to implement IPM programs.

- **Diagnostics**

Four state diagnostic labs identified over 3,000 plant pest and structural pest samples in 2007.

CSU implemented a web-based Plant Disease Information System (PDIS) developed for the NPDPN to help archive diagnostic records on a national scale.

The Colorado Center for Crop Biosecurity, in cooperation with the USDA CAPS program, has conducted surveys for other pests including exotic bark beetles, white pine blister rust, gypsy moth, exotic fruit pests, wheat nematodes, potato cyst nematode and old world bollworm.

A digitized collection of 7,000 agricultural production and pest management images has been compiled for use in agricultural technology transfer products released on CD-ROM and for illustration of integrated pest management and best management practice programs. This image library has now been incorporated into the University of Georgia's Bugwood collection.

- **Projects Supported by IPM Funds**

Booklet on identification of weeds in seedling stage. (Dr. Scott Nissen). Dr. Nissen has published a 75 page pamphlet designed to help growers and consultants identify weeds in the seedling stage. IPM funds were provided to help cover the cost of a second addition.

Integrated management of Dutch elm disease and the banded elm bark beetle. (Dr. W. Jacobi). *Scolytus schevyrewi*, commonly referred to as the banded elm bark beetle (BEBB), is an Asian Scolytid that has first collected in North America in Aurora, CO in April 2003 from a drought-stressed *Ulmus pumila* (Siberian elm) (Negron et al., 2005). By the spring of 2005, *S. schevyrewi* has been found in association with declining and dying elm trees in over 20 states. (NAPIS, 2005). The goals of this project are to determine the interaction of the recently introduced exotic banded elm bark beetle and the Dutch elm disease pathogen so the appropriate integrated pest management options can be developed. Objective 1: Determine if artificially infested BEBB can inoculate healthy American elm with the DED pathogen and establish an infection. Objective 2: Determine *Ophiostoma novo-ulmi* spore loads on artificially infested *S. schevyrewi*. Objective 3: Evaluate insecticides for potential to incapacitate BEBB during twig feeding.

Precision GPS Mapping, Monitoring, and Integrated Management of Key Invasive Plants on Riparian Sites in Boulder County. (Dr. Phil Westra, Weed Scientist; Dr. Raj Khosla, GPS Specialist; Dr. Andrew Norton, Biocontrol Specialist;). This project involves creating GPS referenced maps of key invasive plants such as leafy spurge, Russian olive, salt cedar, and Eurasian watermilfoil in riparian areas of Boulder County. We will initiate control and removal activities in key demonstration areas with the goal of creating zones where restoration with desirable plant species can begin. Where possible, integrated management of invasive plants will be initiated with multiple tactics, including use of biocontrol agents. This project will be the first phase of what we view as a long-term project of 3-5 years to commit significant resources from the CSU program to address invasive plant species in Boulder County.

Improving Pest Management of Beet Curly Top In Tomatoes ( Dr. Whitney Cranshaw and Mike Bartolo). Beet curly top has developed into a very damaging disease of tomatoes and, to a lesser extent, peppers in several Colorado production areas. In recent years it is not uncommon for more than 25% of the tomato crop to be lost to this disease. No effective controls have been demonstrated although there are some promising lines of research including identification of resistant cultivars, use

of reflective mulches and acibenzolar applications. The objectives of this proposal are to evaluate a range of potential controls for beet curly top and to establish a monitoring program for beet leafhopper.

Development of a Multi-access Electronic Key for Identification of Arthropods, Diseases and Abiotic Problems of Small Grains (Dr. N. Tisserat, W. Lanier) Our goal is to provide growers, crop advisors, extension agents, diagnosticians and others associated with crop production with multi-entry, multi-media, commodity-based electronic keys to aid in the diagnosis and management of crop problems. These keys, which differ significantly from dichotomous keys, would facilitate rapid and accurate field/lab identification and provide links to information on IPM strategies for managing the targeted pest. We believe that if a producer is provided with an integrated, easily accessed diagnostic tool that is directly linked to the most up-to-date IPM recommendations, they are more likely to adopt and implement those management practices.

- **Information Delivery**

Colorado participated in the development of the High Plains IPM guide. This web-based guide (<http://www.highplainsipm.org/>) is intended to provide current effective management options for insect and other arthropod pests, and for plant pathogens affecting all major field crops grown in Colorado, Montana, Wyoming, and western Nebraska. Chemical and non-chemical control practices, when available, are described in detail for individual pests and pathogens.

Several IPM publications were developed in 2004. The publication 'Insects and Diseases of Woody Plants in the Central Rockies' was revised and reprinted in 2004 with 1500 copies distributed. An IPM handbook entitled 'Pest Problems in the Home Landscape', targeted for homeowners and Green industry is currently being printed. The second edition of the regional 'Dry Bean Production and Integrated Pest Management' was released in 2004. A book, entitled 'Garden Insects of North America' by Dr. Whitney Cranshaw was printed in 2004. A publication on turf diseases was written by Ned Tisserat and Barb Corwin.

### ***Guam***

The Plant Diagnostic and IPM Education Center is now in its second year and is making headway in becoming a comprehensive center with a fully equipped lab and full time diagnostician. This has been accomplished through the leveraging of personal and financial resources of Cooperative Extension, Western Plant Diagnostic Network, and various USDA-CSREES grants. The Center's ability to act as a conduit for pest and disease identification for Guam and the region and its ability to provide environmentally friendly integrated pest management strategies have improved this past year. Many of the Center's activities are also linked to the Western Plant Diagnostic Network, PestNet, and the Pacific Islands Distance Diagnostics and Recommendation System. The Center provided support to University extension agents and 4H Program, farmers, plant nurseries, golf courses, students, instructors, Guam Plant Inspection Station, Guam EPA, and the general public.

Through the Center's educational and technical support programs, Guam's private citizens, government agencies, farmers, teachers, and school children are made aware of the common pest problems on Guam and where to turn for advise.

- The center conducted over 500 site visits to deal with common plant pest and plant health problems.
- Over 1000 school children and 50 teachers were given one-on-one, interactive instruction on insect and plant disease pests, environmentally friendly pest control methods, and stereo microscope use for pest identification.
- The Center took the lead role in invasive species pest identification by coordinating an annual WPDN First Detector workshop and training session. Fifty participants from various agencies and the public including EPA, Guam Department of Agriculture, Cooperative Extension, and Plant Inspection Station attended Guam's Third WPDN First Detector Training course. Ninety-five percent of participants passed the test to become First Detectors. Ninety-five percent of the 50 participants surveyed stated that the workshop had increased their capacity to identify plant pests and to follow procedures related to invasive species reporting.

The Center's role of technical pest support is perhaps its most important function and enables Guam to rapidly respond to new pests and diseases.

- In 2007, approximately 245 plant disease samples were received by the University of Guam plant pathologists - 145 from Guam Plant Inspection Station (PPQ), and 100 from private citizens and University of Guam extension and research professionals. New plant disease records include crown gall of ficus, black leaf spot of breadfruit, leaf spot of tangantangan, rust on sweet sop, and leaf shot

hole of noni. Four diseased plant images were submitted to Pacific Islands Distance Diagnostics and Recommendation System (PIDDRS) for evaluation.

- 150 insect specimens were received by University of Guam (UOG) entomologists. Two insect pest images were submitted to Pacific Islands Distance Diagnostics and Recommendation System (PIDDRS) for evaluation. New island insect pest records for Guam include: Acacia whitefly on tangantangan, asian citrus psyllid on citrus, mealybug on spider lilly, and coconut rhinoceros beetle on coconut. The coconut rhinoceros beetle could eventually damage or destroy tens of thousands of coconut trees on Guam. 90% of the coconut trees were killed by the beetle on one Palau island. The Center, along with the Guam Department of Agriculture, Aphis, and the Plant Inspection Station, immediately implemented an eradication and IPM control program. The battle will continue for quite some time.
- The Center also implemented a new program to help local farmers, with the theme “fighting pest problems through improving plant health.” Farmers are given on-site instruction through actual demonstrations in their crops on the use of microirrigation equipment including fertigators and tensiometers, plant sap nutrient analysis field kits, and soil fertility field kits.

### ***Idaho***

Statewide outreach in IPM during 2007 at the University of Idaho was conducted through the collaborative efforts of 35 County Extension Educators and 17 State Extension Specialists organized into "Topic Teams," integrated working groups charged with the planning, implementation and evaluation of subject-matter or issue-based research and outreach programs. Teams with IPM objectives and activities during 2007 included Cereals (wheat and barley), Commercial/Consumer Horticulture, Forages, “Other” Commercial Crops (alfalfa seed and hops), Pesticide Safety Education Program, Potatoes, Small Acreage/Emerging Crops, Sugarbeets and Range Management. With the exception of the University of Idaho Extension IPM Coordinator (E.J. Bechinski), teams did not receive direct financial operational support for IPM programming from the USDA-CSREES Smith-Lever 3(d) Extension IPM Program.

Together these nine faculty teams delivered statewide IPM training to nearly 11,000 people. Our educational programs included formal conferences, workshops and intensive short-courses as well as in-the-field demonstrations, trials, tours and fields days at 33 of Idaho’s 44 counties: Ada, Adams, Bannock, Bear Lake, Benewah, Bingham, Blaine, Bonneville, Boundary, Canyon, Caribou, Cassia, Clark, Custer, Elmore, Franklin, Fremont, Gooding, Idaho, Jefferson, Kootenai, Latah, Madison, Minidoka, Nez Perce, Oneida, Owyhee, Payette, Power, Shoshone, Teton Twin Falls and Washington. News releases, newsletters, articles in popular trade journals, public-access television, websites and other mass media approaches reached hundreds of thousands of Idahoans.

University of Idaho Cooperative Extension annually convenes a series of winter commodity schools that provide IPM training opportunities for growers, crop consultants, ag industry fieldstaff and others who advise farmers about pests and pesticides. Significant training venues during 2007 about pest management in cereal crops, forages, potatoes and sugarbeets – our common cropping rotational system – were the UI Potato Conference, UI Snake River Sugarbeet Conference, regional Cereal Schools, and the Idaho Alfalfa and Forage Conference. Subject matter at these conferences included identification and biology of pests and beneficials, field scouting and degree-day forecasting, action thresholds, biological control practices, cultural alternatives to pesticides (such as crop rotations, cover crop systems, pest-resistant varieties and irrigation scheduling), and judicious pesticide use. Major statewide conferences sponsored by other agencies that featured IPM training by University of Idaho extension and research faculty included these: (1) Idaho Crop Production Association – Fertilizer & Chemical Conference; (2) Idaho Horticulture and Nursery Association – Idaho Horticulture Convention; (3) Idaho Weed Control Association – Idaho Weed Symposium.

Horticultural IPM training for backyard gardeners as well as for professional landscape and nursery industry staff continued during 2007. County Extension Educators and State Extension Specialists especially provided IPM training about disease, insect and weed problems in home gardens and urban landscapes to statewide Master Gardener volunteers, who in turn consulted one-on-one with literally tens of thousands of homeowners across Idaho.

### ***Montana***

The Montana IPM Program is programmatically-based on four objectives: 1. To optimize grower profitability through the use of appropriate pest management techniques; 2. Develop sustainable IPM programs for Montana citizens that consider environmental issues and risks; 3. Demonstrate IPM



techniques through on-farm trials and educational programs; and 4. Encourage implementation of IPM strategies. The following 2007-2008 activities support these objectives:

To optimize grower profitability through the use of appropriate pest management techniques

- Chick Pea-Damping-off  
A project was conducted in 2007 to assess the effectiveness of biological and fungicide seed treatments for the management of damping off of kabuli and desi chickpeas. Three biological products (Kodiak, Yield Shield, and T-22) and two fungicides (Apron and Maxim) were field tested at three locations in Montana (Bozeman, Huntley, and Sidney). Apron was the only seed treatment to increase germination relative to the untreated control at more than one location. No seed treatment effects were seen on yield. This research indicates growers wishing to grow chickpeas organically should use best management practices but the biological seed treatments tested were not effective. Conventional chickpea growers should use a fungicide seed treatment using Apron to ensure good plant stands and reduce the need for herbicides for weed control.
- Haanchen mealybug  
The Haanchen mealybug (*Trionymus haancheni* McKenzie) has been present in Idaho since 2003 when severe outbreaks caused over 5 million dollars in yield losses on small grains. Since then Montana has been on the lookout for this pest, with low level infestations first appearing in 2006 within Teton County. This outbreak expanded in 2007, with densities present on irrigated barley systems within Teton, Pondera, Glacier, and Flathead counties. This has caused widespread concern of potential yield loss, economic thresholds, and a need for control measures which could reduce populations of this pest definitively. Field research demonstrated that insecticide provided only 60% control whereas spring tillage provided the best control strategy for suppressing and potentially controlling future Haanchen mealybug outbreaks without alternating to a non-susceptible crop.
- Sugarbeet Cercospora Leaf Spot  
This disease affects approximately 60,000 acres of production in MT. In 1996 a weather monitoring program and disease prediction software was provided to the sugar companies. Use of these tools resulted in a reduction of 60,000 acres of fungicide application. In 2004, our research showed growers that they could utilize varieties with moderate levels of resistance without yield penalty. The Sidney factory district adopted these varieties on 37,000 acres with a net result that that growers applied an average of 1.5 fungicide applications compared to 4 or more applications prior to 1996. This saved growers more than \$1.85 million in 2007. Fungicide resistance monitoring identified resistance to a key fungicide tetraconazole in 2007 and growers were informed to adjust their fungicide selections for the future.
- Sugarbeet Curly Top  
Because of new virus strains and reduced levels of resistance in varieties available to growers, we applied for a Section 18 clearance for Poncho seed treatment. Research in MT and ID was used to get the emergency permit. This treatment was used on ~50% of acreage in our Western Sugar Factory district (15,000 acres) and based on 2007 research this treatment resulted in ~\$280/acre more income to MT producers. In 2008, nearly 100% of seed was treated.

Develop sustainable IPM programs for Montana citizens that consider environmental issues and risks

- Sugarbeet Symposium  
12 hours of pest management training was provided to 475 growers and agribusiness personnel at a 1.5 day meeting that covered sugarbeet pests and pests of crops such as barley, wheat, corn, dry beans, safflower, soybean and alfalfa that are grown in rotation with sugarbeets in MT under irrigation. Topic covered impacts on water quality, worker protection, and implementation of IPM for irrigated crops.
- IPM Workshop  
Thirty-six hours of IPM training were provided to 48 farmers, county agents and agribusiness personnel. Training covered pesticide safety, mycotoxins, water quality and IPM and fertility management for small grains, forage crops, corn and specialty crops such as camellina.
- Vegetable IPM  
Eight hours of IPM training was given to 25 commercial vegetable growers. Include in this training were topics covering pesticide safety, toxicology and residue management.
- Diagnostic Services  
The Schutter Diagnostic lab provided 3654 diagnoses for turf/ornaments, insect pests in buildings and crops. These diagnoses assured that the proper pesticides or other controls were recommended.

Demonstrate IPM techniques through on-farm trials and educational programs

- On farm trials were done throughout MT on weed, insect and disease control. Of particular note were 15 wheat-fungicide plots done statewide demonstrating the effects of foliar diseases and the kinds of

economic returns farmers would get from fungicide applications. Economic returns were found in only 8 plots and farmers would have either lost money or broken even in 7 plots.

- IPM of sugarbeet diseases was done in 6 plots in eastern , MT covering virus management, use of resistant varieties for Fusarium Yellows, seed treatments for damping-off and root rot diseases and fungicide management for Cercospora leaf spot, Powdery mildew and Rhizoctonia crown and root rot. More than 200 growers and agribusiness personnel attended plot tours. Of particular note were demonstration trials that showed the biological control BmJ provided control equivalent the the best registered fungicides for control of Cercospora leaf spot.

Encourage implementation of IPM strategies

- **Farmers Market Clinics**  
A booth at the Bozeman Farmer's Market in Bozeman, Montana was set up for 10 weeks during 2007. The booth was staffed by a member of the Schutter Diagnostic Clinic to accept diseased plant samples, insects and weeds for identification as well as a special guest. A new topic was presented by the guest each week. Examples of topics included insects, soil fertility, weed control, and native turfgrasses for the home landscape. A total of 628 questions were asked by customers at the booth, and hundreds of MontGuides and fact sheets promoting IPM methods were distributed. A number of customers received a proper diagnosis for their pest problem and either appropriately timed or did not spray a pesticide as a result of their conversation with us. Some of the most common questions asked in 2007 were about cottony ash psyllids, how to control ants, diagnosing and control of fire blight in apples, spruce budworm control, and weed identification and control. The audience was diverse, from homeowners who wanted to control weeds on their property without using herbicides to those who wanted to know what insecticide to drench their harmless ants with. Some of the most popular MontGuides people picked up were horticultural, including how to grow tomatoes, raspberries, and garlic and spruce trees. Richardson ground squirrel control was a concern, and a list of soil testing agencies was very popular. The most common weed concern was how to control knapweed, and we distributed a number of the color booklets on knapweed identification and control.
- **Mycotoxin Workshop**  
In 2007, MSU co-hosted a second mycotoxin workshop with Purdue University. The first Mycotoxin Workshop was offered to the GPDN in 2006. Dr. Barry Jacobsen presented current information on mycotoxigenic fungi and mycotoxicosis. In 2007, Dr. Jacobsen was joined by Dr. Charles Woloshuk at Purdue University who provided additional expertise on molecular and biochemical identification of mycotoxin producing fungi and mycotoxins. This workshop was offered to the National Plant Diagnostic Network via web-conferencing. The workshop was attended by at least 60 individuals at 36 sites in 15 states plus one location in Canada (Appendix A). Nina Zidack provided coordination with Purdue University and Will Lanier (Entomology) provided IT support. Nina Zidack co-authored a piece describing the workshop for the December issue of the NPDN newsletter. This workshop covered the biology, control and epidemiology of mycotoxin producing fungi

### ***Oregon***

The Oregon State IPM Program, housed within the Integrated Plant Protection Center (IPPC), has continued to develop and deliver IPM tools and services and provide funding and other forms of support for IPM stakeholders in Oregon. In 2007, some highlights include 1) development of a weather-based IPM decision support system for the 48 contiguous states, in Beta testing form, that provides state of the art forecasts for the Pacific Northwest states, 2) delivery of a new IPM Farm-scale planning and IPM record keeping outreach program to a series of commodities and regions in Oregon, and 3) development and delivery of new decision support tools and outreach programs in conservation biological control and pollinator protection, in partnership with the Xerces Society for Invertebrate Conservation. The IPPC provided \$552,038 to IPM stakeholders beyond its own programs in FY 2007.

### ***Utah***

The 2007 Utah IPM Extension program reached thousands of clients through efforts in outreach and research.

- The IPM pest advisory service, which has been in existence to help tree fruit growers for almost 10 years, has grown in content and clientele. A new advisory (for landscape pests) was added and the material included in each weekly report was expanded to include images, articles, and other timely information. A self-subscription service was adopted, and in 2007, the number of subscribers to the tree fruit edition expanded from 300 to almost 1000, while the new landscape pest advisory has almost 300 new subscribers. To generate the information in each advisory, the IPM project leader scouts 7 tree fruit and 6 landscape locations in northern Utah, and manages 11 volunteer scouts for tree fruits, and 2 for landscapes.

- The Utah Pests Website and other written publications have also been well-received. The Website continues to be expanded with hundreds of images in its searchable image gallery. “Utah Pests News”, a quarterly newsletter launched in 2007, now reaches approximately 3000 individuals, and is available as a subscription email service, or on the Utah Pests Web site. It features relevant pest news pertinent to citizens of Utah, recent research activities, and spotlights success stories, such as growers practicing IPM. The Utah IPM program has also added approximately 23 new fact sheets in 2007. The fact sheets support the diagnostic information the Utah Plant Pest Diagnostic Lab sends to clientele, are read extensively on-line, are available in garden centers, Extension offices, city offices, and other locations across the state.
- The Utah IPM Extension program administers an IPM mini-grant in conjunction with Western SARE. The grant is for USU county Extension agents to perform research pertinent to their counties and regions and provides them with opportunities to complete promotion or tenure. This year, five programs were funded to study turf nutrition, alfalfa weevil thresholds, abiotic disorders of trees, using beneficial insects, and control of alfalfa stem nematode.
- IPM research for 2007 included examining how onion thrip life stage survival affects IPM implementation, test monitoring and management options for cucumber beetles, and ongoing research to determine lure efficacy and thresholds for codling moth in mating disrupted apple orchards. Two new fact sheets, “Onion Thrips,” and “Western Striped Cucumber Beetle and Western Spotted Cucumber Beetle” have been generated from this research. Onion thrips are the major pest of onions in Utah, and now growers are able to better manage them using a multi-pronged approach that boosts onion health and tolerance to thrips as well as timely insecticide applications. The cucumber beetle research provides growers with improved scouting techniques and management recommendations. These recommendations will help to prevent future outbreaks.

### **Washington**

Agricultural producers and public and private property managers in Washington State face an uncertain future with respect to pest management options. In the ten years since FQPA was enacted, EPA has succeeded in reassessing 99% of the required food tolerances of pesticides that pose the greatest risk to human health; implementation of these reassessment decisions continued through 2007 and beyond. By the beginning of FY 2007, EPA had started a new program called registration review which will re-evaluate each active ingredient regularly every 15 years. This legislative mandate and the mandated riparian buffers to protect endangered aquatic species from pesticide exposure have resulted in numerous discontinued or severely restricted pesticide registrations. Despite this regulatory quagmire producers are gaining a better appreciation of the importance of preserving beneficial arthropods and other non-target species.

- IPM extension and research activities include pest monitoring, crop injury assessments, pest identification, studies on alternative control technologies and efficacy studies on alternatives to conventional pesticides. Data from the 2007 WSU Online Review and Query System (WORQS) database indicate that over 126 WSU faculty, administrative/professionals and staff from nine centers or departments were involved in IPM projects. In recent years, WSU IPM activities have placed more emphasis on small farm operations and reaching underserved groups of people, including Southeast Asian and the Hispanic growers and ranchers.
- There are other significant sources of funding for WSU-IPM activities besides the Smith Lever 3(d) allocation Washington State receives annually. Many commodity-based groups in Washington State provide resources to support IPM research. The Washington State legislature provides funding for research on pesticides, alternatives to pesticides, and other pest management strategies. These funds will go toward IPM outreach and surveys of growers, farm workers, and other stakeholders to document changes in pest management practices, attitudes, and perceptions. These outreach programs are designed specifically to facilitate the growers’ transition from high-risk azinphos-methyl-based codling moth control strategies to reduced risk alternative chemicals and alternative technologies. For the cattle IPM projects, additional resources come from special federal initiatives such as the Pest Management Alternatives Program and the Federal Crop Insurance Corporation Risk Management Agency partnership program.
- Washington State University provides financial support for collaborative, interdisciplinary teamwork through the WSU CAHNRS Agricultural Extension Issue-Focused Teams Initiative. The state legislature had another Unified Industry-Based Agriculture Initiative funded in 2007 called the Emerging Research Issues for Washington Agriculture Internal Competitive Grant Program, which has a goal of providing greater responsiveness to emerging research and outreach needs. The team formed to address this goal will be studying drought effects on the production and pest management of various irrigated crops. Climate models for the Pacific Northwest predict increased precipitation. This coupled with increased summer temperatures will present challenges to agricultural producers and increase the potential for competition from weeds and may lead to increased populations of pest arthropods.

- Accessibility of crop pest management information is facilitated by the Washington State Pest Management Resource Service (WSPRS, <http://wsprs.wsu.edu>, maintained by WSU Extension Specialist Dr. Catherine Daniels) and the Washington State University Integrated Pest Management website (<http://ipm.wsu.edu/>, maintained by WSU Research Communications Specialist Sally O’Neal).
- The structure of the Agricultural IPM pages was revamped in 2007 to include more subpages to better reflect the 2006-2008 IPM Plan-of-Action areas of emphasis. Elsewhere on the Internet, virtually all the minor crops of Washington State can be accessed through WSCPR’s new Washington Agriculture Project. The Washington Agriculture Project is the new and improved edition of the 1995 Washington Minor Crops Handbook. The PNW Pest Control Handbooks are all online and were updated for 2007.
- Multiple commodity IPM educational outreach and demonstration activities were conducted during FY 2007 on local, state, multi-state, national, and international levels. A variety of IPM presentations addressed youth and the urban/suburban sectors. Updated IPM information was also delivered to mass audiences via various trade journals, newspapers, WSU publications, Extension Bulletins, newsletters, and research conferences and journals. The new *MasterGardener* magazine was launched in late FY 2007; *MasterGardener* magazine and its companion online version are published by GFG Publishing, a division of the Washington State Fruit Commission.
- Routinely, IPM research projects are leveraged through the Washington State Commission on Pesticide Registration (WSCPR), which supports all IPM research relevant to Washington State. The WSCPR funded 48 IPM-related projects in 2007, awarding a total of \$688,300 for projects directed at 29 commodities or usage areas. All grantees are required to document substantial Washington State stakeholder support. An additional \$992,811 in matching funds (both cash and in-kind) were awarded to these IPM-related projects in 2007. Most of the grants were awarded to Washington State University research and Extension scientists.
- IR-4 research conducted at the WSU-Prosser station involved conducting magnitude-of-residue studies on specialty crops. In 2007, 15 IR-4 residue trials were completed on ten different crops. Twelve pesticides were tested with two insecticides assigned “reduced risk” status by the EPA in certain commodities. In 2007, several special registration letters of support were submitted and granted including acephate on mint; diflubenzuron on hybrid poplars; generic bifenthrin, bifenazate, acetamiprid and flonicamid on alfalfa seed; and permethrin (British Columbia) on wine grapes.

## Outcomes

### *California*

#### **IPM In The News For Every Season, Turn to Year Round Program**

USDA NRCS - Year round Programs required for IPM incentives program.

Farmers - easy access to pest management information

Pest Control Advisors - deeper, richer information about IPM

Cooperative Extension - venue for current information

Pest Management Guidelines have been reorganized to reflect the way in which farmers and Pest Control Advisors (PCAs) view the world. The cropping season is divided into key developmental events (pre-bloom, bloom etc) with the key pests during that time grouped together. In addition, more photo galleries, monitoring forms and biological information has been provided.

Developed for specific crops, annual IPM checklists guide farmers through a year of monitoring pests, making management decisions, and planning for the following season. These year-round IPM programs also outline practices that don't deteriorate our water through runoff or spraying during runoff.

Each year-round program recommends specific activities for each season, with links that provide information on how to monitor, forms to use, and specific management practices. Progress throughout the year is tracked on an annual checklist form

These year round programs provided access to information that will improve decision making (improving profitability), reduce environmental hazards by allowing the risks of different pesticides to be compared.

The University of California Statewide IPM Program created the year-round programs to help growers avoid water quality problems related to pesticide use. The programs, accompanied by the pest management guidelines, make up UC's "Best Management Practices" for managing pests and protecting the environment. The USDA National Resources Conservation Service is also using the programs as guidelines for funding pest management components of NRCS conservation plans. (Report dated May-19-2006)

#### **Indoor pest management guide helps improve knowledge of practitioners of institutional IPM**

Shielding school children from harmful pesticides is just one of the many features in the second edition of Residential, Industrial, and Institutional Pest Control by the University of California Statewide Integrated Pest Management (IPM) Program.

The book highlights new information for carrying out environmentally friendly IPM programs in and around schools and other public and private buildings. Topics include how to select appropriate pesticides, how to monitor for pests, and how to effectively use safe control tools such as cockroach and ant baits, traps, and sanitation practices.

The reference book is Volume 2 in the Pesticide Application Compendium series, a six-book collection that belongs on the bookshelves of anyone who uses pesticides, supervises their use, or instructs others in the proper use of pesticides

With more than 60 pests covered, the manual contains tips on using gel baits for cockroaches, removing bees from walls in buildings, applying repellants for relief from mosquitoes, and ways to identify common household ants. Information on many new pests, including booklice, carpenter bees, and carpenter ants has been added to this completely revised edition.

The latest techniques and pest management tools, as well as review questions to help those studying for the California Department of Pesticide Regulation (DPR) and Structural Pest Control Board exams, also are included in the book. It is the recommended study guide for California DPR's Qualified Applicator

Certificate and Qualified Applicator License examinations in the Residential, Industrial, and Institutional Pest Control category.

These pesticides compendia are important in maintaining quality educational material to those who service the institutional pest management needs of Californians. They are required reading for those seeking qualified applicator licenses. This increased knowledge should help reduce risk to human health and the environment through the improved use of IPM in urban settings (Report dated Mar-29-2006)

### **Alfalfa Growers Got Year Round IPM Support**

Alfalfa farmers: They have easy to follow to IPM guidelines that represent the annual crop cycle.

Pest Control Advisors: Have access to a rich and deep information source for integrated approaches to pest management, pest identification and decision making.

Environmentalists: Can understand the alternatives to high risk pest control approaches to safe guard humans and the environment.

The pest management guidelines for alfalfa were restructured to allow easier navigation to information based on annual crop events. In addition, new features for pest identification, monitoring and decision-making have been incorporated including WaterTox, an implementation of NRCS WinPST.

The Year Round IPM Program for Alfalfa should allow for improved decision-making that will reduce the risk to the environment. Run-off from alfalfa fields of organophosphates can be better mitigated through improved monitoring, pest identification and choice of reduced risk alternatives and practices. (Report dated Apr-02-2007)

### **Another Weed in South Central Valley Shows Resistance to herbicide**

Growers and land managers have trouble controlling hairy fleabane with labeled rates of glyphosate. Because glyphosate is an herbicide that provides broad-spectrum weed control appropriate strategies to prevent herbicide resistance must be taken to avoid losing this effective herbicide.

Hairy fleabane's resistance to glyphosate was first reported in 2005 in Fresno to UC IPM Weed Ecologist Anil Shrestha. Since then, Shrestha and two other scientists have collected hairy fleabane seeds from several locations in the Central Valley and tested them for resistance to glyphosate.

They sprayed the herbicide at various growth stages of the plant and found most plants collected from Davis and Fresno died with the labeled rate of glyphosate while plants from Reedley showed resistance. In fact, the Reedley samples survived up to eight times the labeled rate. Some even survived a dose of 16 times the labeled rate.

Shrestha and his team have conducted meetings to ask growers to employ an integrated pest management program to manage insecticide resistance that includes reliance on multiple nonchemical practices (such as cultural and biological controls), spraying insecticides only when absolutely necessary, and rotating insecticides from chemical classes (organophosphates, pyrethroids, insect growth regulators, etc.) with different modes of action.

By employing cultural and biological controls contained in a comprehensive IPM program, growers can reduce unnecessary insecticide use and, therefore, decrease environmental and human health risks associated with responsible pest management.

### **Touch-Screen Kiosks Help Consumers Solve Home and Garden Pest Problems**

Residents and home gardeners should be interested in the kiosks that are designed to help solve pest problems. Users can find information about 50 common home and garden pests.

The kiosks are designed to help users identify and manage 50 common home and garden pests, become familiar with alternatives to pesticides and least-toxic pest control, as well as safe use and disposal of pesticides. The kiosks also include tips about proper watering, fertilizing and avoiding problems associated with garden chemicals.

Twelve kiosks are circulated around the state at retail nursery and garden centers and as part of UC Master Gardener outreach events, county fairs and plant clinics, libraries and garden exhibits.

The UC Statewide IPM Program has an updated list of dates and locations on its Web site at [www.ipm.ucdavis.edu/FAQ/kiosk.html](http://www.ipm.ucdavis.edu/FAQ/kiosk.html).

The IPM kiosks are designed to educate consumers about the least-toxic pest control methods. By identifying alternatives to pesticides, consumers can protect themselves and the environment.

### **UC Offers Information about Light Brown Apple Moth**

In March 2007 the presence of the light brown apple moth (LBAM), *Epiphyas postvittana*, was confirmed in California by the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS).

APHIS issued a Federal Domestic Quarantine order on May 2, 2007, with restrictions on interstate shipment of plant material, and the California Department of Food and Agriculture (CDFA) issued a State Interior Quarantine order restricting intrastate shipment of plant material from counties where light brown apple moth is known to occur.

The light brown apple moth has since spread to nearly a dozen other counties in California. The moth likes to eat more than 250 plant species, including grapes and other key crops. Growers are especially interested in controlling this prolific pest.

The UC Statewide IPM Program created a brochure to answer the many questions that growers and residents may have about the moth and its impacts. The brochure is posted on its Web site at [www.ipm.ucdavis.edu/EXOTIC/lightbrownapplemoth.html](http://www.ipm.ucdavis.edu/EXOTIC/lightbrownapplemoth.html).

The publication answers questions about how to identify the moth, its biology, management alternatives and regulation, and possible impacts on California commodities and residential areas.

Authored by nine UC scientists and reviewed by experts from across the U.S. and from Australia and New Zealand, the publication was put on the fast track to quickly fill the immediate need for information by UC Cooperative Extension county staff.

The quick creation of this brochure aided UCCE personnel in educating growers and residents who had seen numerous news reports on the light brown apple moth and the destruction it can cause. This brochure indirectly helped to decrease environmental risk associated with pests and pest management activity (Report dated Aug-10-2007).

### **Vine Mealybug Life Stage Influences Response to Insecticides**

CDFA reports that 17 California counties are infested with vine mealybug. Once established, the bug is difficult to eradicate. The host range of the mealybug includes grapes, figs, date palms, apples, avocados, citrus and some ornamentals. Currently, the pest is found feeding only on grapevines in California.

Vine mealybug produces a sticky, sugar-laden substance called "honeydew" that promotes mold and bacterial growth and damages fruit clusters to the point where they can't be marketed. Grape growers and wineries are especially interested in keeping this pest in check.

UCCE Riverside scientist Carmen Gispert and entomologist Nilima Prabhaker from UC Riverside tested vine mealybugs' reaction to the five most common pesticides used to control them.

The researchers obtained baseline information to be compared to future tests to determine if reduced efficacy of some insecticides is related to resistance of the pest to some of these insecticides. This

information will help pest control users to choose which treatments are best in particular situations and could help to refine management programs for vine mealybug.

By helping pest control users to choose which treatments are best in particular situations and educating them on how to avoid unnecessary insecticide treatments, this research project helps to decrease environmental risk associated with pests and pest management activity (Report dated Apr-23-2007).

### **Citrus Thrips Add Blueberries to Their Diet**

With the creation of heat-tolerant blueberries, the blueberry industry is growing in California. Blueberry growers are reporting citrus thrips as a threat to their crops.

The relative lack of natural enemies is one of the reasons that insecticides are being overused to combat citrus thrips.

With the limited number of pesticides available to blueberry growers, it is wise to monitor citrus thrips, limit treatments only to populations that are causing significant levels of damage, and to time and apply treatments optimally so that reapplications are not required.

UCCE Kern County Entomology and Pest Management Farm Advisor David Haviland, UC Riverside entomologist and citrus thrips expert Joseph Morse, and blueberry expert and farm advisor Manual Jimenez have found what time of year citrus thrips are present in blueberries, where to look for thrips on the crop, how to monitor for thrips, and some of the damage they cause.

The team also tested nonchemical controls, such as the use of high-pressure water with an air blast sprayer, as a way to reduce the number of pesticide applications per season.

By giving growers information about what time of year citrus thrips are present in blueberries, where to look for thrips on the crop, and how to monitor for thrips, the scientists in this research project are helping growers recognize the pest problem early on and possibly avoid unnecessary insecticide use. This may help to decrease environmental risks associated with pests and pest management activity.

### **Ecologically Smart Choices Outlined in Tomato Year-Round Program**

Tomato growers should be interested in the year-round program because it helps them to identify major activities they need to do at each crop growing stage to implement a comprehensive IPM program.

The tomato year-round IPM program covers the major pests of tomatoes for processing in the Sacramento and San Joaquin valleys.

Growers who use the year-round IPM program for tomatoes can earn \$125 per acre through the California Natural Resources Conservation Service's Environmental Quality Incentives Program in 2008.

Based on UC research, the year-round program provides annual checklists that guide farmers through a year of monitoring pests, making management decisions, and planning for the following season. These season-specific activity checklists help growers and PCAs to integrate management practices for insects, mites, pathogens, weeds, nematodes, and vertebrate pests into a thorough IPM program.

Each checklist item links to a UC IPM pest management guideline for in-depth information on how to carry out management practices, monitor for pests, and choose appropriate management tools.

The programs also outline IPM practices to reduce water quality risks and other environmental problems. Problem pesticides are identified through the UC IPM WaterTox database that rates available options according to their potential to damage water quality.

The tomato year-round program also offers detailed procedures for determining the need for treatments for pests such as potato aphids and fruitworm, and includes monitoring procedures, record-keeping forms, treatment thresholds, and photos of important pests and natural enemies.



The year-round programs arm farmers with season-specific activity checklists to help them use IPM methods for their pests. Growers learn how to identify, manage and monitor pests responsibly. This information helps growers to reduce water-quality risks and other environmental problems (Report dated Jan-25-2007).

## **Idaho**

### **IPM and the Idaho Potato Industry: Results of Statewide Grower Surveys During 2006**

#### **Background**

We documented the use of integrated pest management practices within the Idaho potato industry by conducting a statewide survey of commercial (non-seed) potato producers during spring 2006. Our objective was to measure progress made by growers towards the National IPM Road Map goal of increasing adoption of pest management practices. Our prior surveys conducted during 1992 and 1998 provided the quantitative basis for documenting changes in pest management practices.

#### **Who Participated?**

We mailed a 132-item survey questionnaire to 500 randomly-selected commercial potato growers in Idaho during March 2006. The 2006 instrument posed the same questions as our 1992 baseline survey and our subsequent 1998 progress survey. We followed standard Dillman Total Design Methods in executing our survey.

Here we highlight results from 177 completed surveys returned to us. Those respondents represent approximately 30% of all commercial potato growers in Idaho.

The typical survey respondent farmed 1,600 to 2,000 acres annually. Mean yearly potato production ranged between 250 to 400 acres planted, virtually all of which was Russet varieties grown under sprinkler irrigation either for fresh market or for processing into french fries. The typical survey respondent was a 40-to-50 year old male high school graduate who had taken some college coursework. Their mean gross total farm sales was \$500,000 to \$1 million annually.

#### **What Growers Said About Potato Pests**

Idaho potato growers ranked weeds as their most important pest problem; 34.5% said weeds were “serious” problems (vs “moderate” or “not a problem” rankings) that required control during their past three potato crops. But growers also perceived overall pest status as declining in importance since 1998. In particular, whereas 39%, 33% and 33% of 1998 survey respondents respectively said that diseases & nematodes, weeds and insects were “serious” problems, the percentage of 2006 respondents who ranked diseases, nematodes, weeds and insects as “serious” was 23%, 15%, 34% and 26%, respectively. Only rodents increased in perceived pest status, doubling from 12% to 24% of growers ranking as “serious” since 1998.

The top-three pests according to our 2006 survey were annual broadleaf weeds (49% growers ranking as “serious”), Colorado potato beetle (40% growers ranking as “serious”) and white mold (22% growers ranking as “serious”). In contrast, 1998 survey respondents reported their 3 most important pest problems were late blight, annual broadleaf weeds and green peach aphids; here 40 and 50% of 1998 respondents ranked these as “serious.”

#### **IPM Practices — Alternatives to Pesticides**

Growers widely use cultural practices and related tactics to manage potato pests, especially diseases (Table 1). More than 3 in 4 growers practice a suite of cultural pest controls that includes crop rotation, planting certified seed, cultivation, disease sanitation, destruction of alternative pest hosts, and adjustment of seasonal fertility and irrigation practices.

Crop rotation remains a critically important tactic for potato IPM. Nearly 7 in 10 Idaho potato growers manage diseases, nematodes, weeds and insects by following a 3 or 4-year rotation (i.e., potatoes only every third or fourth year in a given field site).

Use of about half of the practices in Table 1 was statistically greater in 2006 than during 1998; here the 2006 values were at least 5-points greater than their 1998 values. Use of the remaining practices held steady at their prior levels; here the 1998 and 2006 adoption-rate values were within 5 percentage points of each other. An exception was destruction of cull potatoes for late blight management; use of this tactic significantly decreased since 1998.

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**Table 1. Cultural, mechanical and physical IPM practices used by Idaho potato producers.** Values are percentage of growers using IPM practice on more than half their commercial acreage on average during their past three potato crops. Square brackets [ ] show IPM practices that differed by more than 5-percentage points since the 1998 statewide survey. Not shown: practices used by <25% growers.

DISEASE AND NEMATODE MANAGEMENT

99%	plant certified seed [+5 points since 1998 (94%)]	
91%	adjust fertility & irrigation practices to manage diseases	[+5 points since 1998
86%)]		
88%	control weeds that are alternate hosts of potato diseases	[+6 points since 1998
82%)]		
85%	destroy cull potatoes to reduce sources of late blight [-11 points since 1998 (96%)]	
84%	sort and remove decayed tubers coming into storage	
67%	alter crop rotations for disease control	
69%	clean field equipment for nematode control	
65%	alter crop rotations for nematode control	
25%	separate potato fields $\geq 1/4$ -mile to control diseases [+8 points since 1998 (17%)]	

WEED MANAGEMENT

84%	cultivate for weed control
62%	choose rotational crops that compete with weeds
42%	control fencerow weeds by growing cover crops [+12 points since 1998 (30%)]
38%	clean equipment between fields to prevent weed spread [+11 points since 1998 (27%)]

INSECT MANAGEMENT

39%	alter crop rotations for insect control [+12 points since 1998 (27%)]
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Virtually no gains have been made in use of biological control practices since 1998. Here we include use of green manure crops for disease and nematode suppression. Approximately 1 in 3 of 2006 survey respondents said they had used green manure crops on at least some of their commercial potato acreage, exactly the same as reported during our 1998 survey. The situation generally was similar for insect biological control, although gains were realized among growers who reported they reduce insecticide application rates to reduce harm to natural enemies (32% of 2006 respondents vs 24% of 1998 respondents). Field scouting for beneficial natural enemies of insect pests was identical (32% and 33% of 2006 and 1998 survey respondents, respectively). Direct use of insect biocontrols is virtually untried; more than 9 in 10 growers said they never mass-release insectary-reared agents, never use “least-toxic” biorational pesticides (such as Bt microbial insecticides), and never plant fencerow insectary plants as habitat for natural biocontrol agents.

Use of field scouting generally held steady since our 1998 survey. Depending on the pest, at least 8 in 10 growers depend on scouting to determine pesticide use. Indeed, in the case of late blight fungicides and Colorado potato beetle insecticides, adoption of field scouting is near absolute; here 96 to 98% growers reported that more than half their acreage is scouted. Continued extension programming to maintain these use rates is critical; we credit earlier extension work at the University of Idaho with doubling use of field scouting and thresholds between 1992 and 1998. One decrease in Table 2 that deserves more scrutiny is the reduction in growers who said they keep written notes or maps about pest infestations.

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**Table 2. Pest scouting, thresholds and pesticide-use decision aids used by Idaho potato producers.** Values are percentage of growers using IPM practice on more than half their commercial acreage on average during their past three potato crops. Square brackets [ ] show IPM practices that differed by more than 5-percentage points since the 1998 statewide survey. Not shown: practices used by <25% growers.

98%	scout fields for late blight to determine need for fungicides
96%	scout for Colorado potato beetle [+5 points since 1998 (91%)]
86%	examine potato leaves for aphids
83%	scout potato fields to determine need for herbicides
78%	use thresholds to determine need for insecticides [-5 points since 1998 (78%)]
72%	rotate herbicide classes to avoid resistance [+7-points since 1998 (65%)]
72%	rotate insecticides to avoid resistance

- 70% scout previous crop for weed problems
  - 59% keep written notes or field maps about weed problems [-13 points since 1998 (72%)]
  - 68% apply nematicides only if infestations exceed thresholds
  - 65% adjust herbicide application rate based on weed pressure
  - 60% use forecasting models to time fungicides for late blight [+9 points since 1998 (51%)]
  - 50% keep written notes or field maps about insect problems [-14 points since 1998 (64%)]
  - 57% sample soil for nematodes [51% during 1998]
  - 51% keep written notes or field maps about disease problems [-6 points since 1998 (57%)]
  - 24% spot-spray weed patches vs entire field
- \*\*\*\*\*

Use of computer-aided scouting technology is just beginning. More than 8 in 10 growers said they never use PDAs or other hand-held devices to record scouting data in the field (although here it is noteworthy that 12% said they use this technology on all of their acreage). Similarly, 83% said they never use GPS/GIS technologies to map pest infestations; 4% said they use GPS/GIS on all their acreage to map pest infestations.

Nearly half (47%) of 2006 survey respondents said they use University of Idaho websites to identify pests or to access potato IPM advice; this value compares with 33% who said they use websites other than those of the University of Idaho. The three most widely accessed UI sites and the percentage of growers who said they had used those sites were as follows:

Idaho Center for Potato Research & Extension	25% growers
Treasure Valley & PNW Pest Alert Network	22% growers
Idaho Pest Management Center	21% growers

All other UI websites noted in the 2006 survey were used by 5% or fewer of growers.

#### **IPM Practices — pesticide use patterns**

Pesticides remain an integral part of potato pest management. Our 2006 survey showed that virtually all commercial potato acreage in Idaho (95% to 98%) is treated with an herbicide, fungicide and insecticide. Survey respondents also reported they applied nematicides and soil fumigants to 64% and 70% of commercial potato fields, respectively. All of these 2006 values are within 3-points of values from our 1998 survey, indicating there have been no significant changes in the proportion of commercial fields that receive pesticide treatments.

Survey data showed substantial decreases in the proportion of commercial fields treated with certain insecticides. In particular, use of soil insecticides applied at planting for aphids and wireworms declined 16-points from 76% fields treated during 1998 to 57% treated on average during the past three potato crops per our 2006 survey. Similarly, use of soil insecticides applied at planting for Colorado potato beetle declined 13-points from 68% fields treated during 1998 to 55% treated on average during the past three potato crops. There also was a 15-point decline in fields treated with foliar-applied insecticides for aphids: from 86% fields treated during 1998 to 71% treated on average during the past three potato crops. The only significant increase (i.e., 5-point difference) in insecticide use was foliar applications directed at Colorado potato beetles: from 65% fields treated during 1998 vs 75% during 2006.

It has always been true that Idaho potato growers generally do not make repeated pesticide applications to the same field during any single growing season; about 70% of fields receive one herbicide application and one insecticide application annually. An exception is fungicide use for late blight; here multiple applications historically had been the norm. A most notable change documented by our 2006 survey was a dramatic 60-point decrease since 1998 in the proportion of fields repeatedly treated with fungicides for late blight: from 74% of fields during 1998 treated 4 or more times during the season to 14% of fields treated 4 or more times during 2006. Conversely, the proportion of fields receiving 1 or fewer fungicide applications for late blight increased from 4% during 1998 to 34% during 2006.

#### **INTERPRETATION**

The question of exactly which practices a producer must use to be considered an IPM grower is open to interpretation if not heated argument. IPM is not a specific set of one-size-fits-all practices but instead involves a continuum of many possible control tactics.

At one end of the continuum is “prescriptive IPM.” Just as a physician diagnoses ailments and prescribes drugs to treat health problems, “prescriptive IPM” too depends on diagnosis and treatment — pest scouting

and thresholds to determine the need for pesticides. At the other end of the continuum is "biointensive IPM." Here the idea is to prevent infestations from occurring in the first place by intensively using biological and other non-chemical control tactics that prevent pest problems.

Results here show that about 80 percent of Idaho potato producers meet the scouting and thresholds standards for prescriptive-to-midlevel-biointensive IPM system. Gains in IPM adoption especially are evident when judged against our 1992 baseline surveys; perhaps 1 in 3 growers had met this standard for prescriptive IPM fifteen years ago.

There remains a real need for research and extension programming to create, refine and demonstrate a new toolkit of practical biointensive IPM measures.