Western IPM Center
Fostering responsible pest management for a sustainable future.

The Western Front

NEWSLETTER OF THE WESTERN INTEGRATED PEST MANAGEMENT CENTER February 2010

Highlights of Western IPM Center 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.

Integrated Control of Spotted Knapweed: Utilizing Spotted Knapweed Resistant Native Plants to Facilitate Revegetation

Principal Investigator: Mark Paschke, Colorado State University

Summary: Affordable long-term methods of weed control are lacking for many of North America's most destructive exotic invasive plants, including the knapweeds. Recent research suggests that some exotic weeds are so successful because they produce potent toxins that are novel to the native species in their invaded range. In particular, the use of novel chemical weapons (allelochemicals) has been implicated as a mechanism of invasion for spotted, diffuse, and Russian knapweed.

Investigators proposed that native North American species that are resistant to knapweed chemicals may be used to detoxify these chemicals and facilitate establishment of diverse native communities in knapweed-infested sites. Through previous work funded by the WIPMC, they identified North American grassland species that are resistant to the toxin produced by spotted knapweed. Further, they discovered that some of these resistant species detoxify chemicals by secreting organic acids into the soil. These organic acids in turn appeared to protect neighboring susceptible plants from the toxic effects of knapweed toxins. Based on those results, they proposed to test whether planting native species that are resistant and secrete large quantities of organic acids could be used as a method to facilitate replacement of spotted knapweed monocultures with diverse native communities.

Objectives were to 1) determine if plants that excrete high concentrations of organic acids into the rhizosphere (the soil region around a plant's roots) could be used to detoxify spotted knapweed soils and allow for the subsequent establishment of native vegetation and 2) identify which of the knapweed chemical-resistant plants identified in the previous funding cycle also produce high concentrations of knapweed chemical-fighting organic acids.

Results: *Objective 1:* In greenhouse studies, knapweed chemical-resistant species and oxalic acid treatment did not improve native species biomass, suggesting that these resistant species are not good nurse crops for encouraging native grassland species in competition with knapweed. However, investigators also conducted field experiments where they applied different native plant seed mixtures to areas infested with Russian and spotted knapweed. In these field studies, results indicated that seeding native species that are good competitors, or potentially resistant to knapweed chemical effects, increased the diversity and abundance of native plants. However, it is yet to be seen if this increase in natives will reduce exotic invasion. Field studies from this project will continue to be monitored for several years using other funding sources. *Objective 2:* Results from lab experiments showed there was no correlation between oxalic acid secretion and knapweed chemical-resistance.

Matt Schultz, Colorado State University

A greenhouse experiment used to examine effects of establishment order on competition between spotted knapweed (Centaurea stoebe) *and two native species,* Festuca idahoensis *and* Gaillardia aristata.

Impacts and Potential Impacts: Several of the field studies indicated that planting native species shown to be resistant to knapweed phytotoxins can increase the diversity and abundance of native plants within knapweed infestations. This knowledge could eventually lead to the development of better revegetation regimes utilizing native plants that tolerate knapweed chemical interference and eventually facilitate the establishment of desirable vegetation. Such knowledge would lessen dependence on herbicides for the control of knapweeds. As the field studies established under this project mature, investigators will make recommendations regarding seed mixtures and species that would be useful for revegetating infestations of spotted and Russian knapweeds. This approach might be extended to other known or yet-to-be-discovered allelopathic invasive species. Results from these studies could be rapidly assimilated and utilized by land managers, because the approach involves existing methodologies (seeding) and does not necessitate additional equipment or expenditures. Rather, implementing results from these studies involves a switch to more effective revegetation species. Such weed-combating seed mixtures would reduce control costs, since competitive plant communities should hinder re-invasion by weeds and would thus lessen the need for additional management actions and restore value to degraded rangelands.

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What's Inside

Diane Clarke

Director's Comments

Forty-eight applications were submitted in response to the last WIPMC RFA, with the following emphasis area breakdown: 25 Addressing Western IPM Issues, six Work Groups, 15 Publications/Outreach, and two Surveys. See the box below for the breakdown of awarded funding. The Center continues to receive requests for more funding than is available. Many of the requests are very fundable. Applicants were advised of the funding status within a few days of the completion of the review process and were told of other current funding opportunities such as the Regional IPM Grants program. Other current RFAs are:

- Organic Agriculture Research and Extension Initiative, $19 million, due February 16, 2010.
- Risk Avoidance Mitigation Program, $4.2 million, last year released in March.
- Crops at Risk, $1.3 million, last year released in March.
- Pest Management Alternatives, $1.4 million, due March 3, 2010.

There were 32 accepted applications to the Regional IPM Competitive Grants Program, Western Region. Review of these applications will take place in mid-March. Unfortunately, five proposals were rejected due to a failure to submit Relevancy Statements. In at least two cases, the statements were written and provided to the Sponsored Programs office but not attached to the final submission. Rejection on this basis is harsh but necessary to be consistent with the requirement of receiving complete applications by the due date and time. As applicants, please ensure that your submissions are complete and that all attachments are included. Followup with your program offices is strongly encouraged. The WIPMC will be working with the other Centers and USDA to find ways to allow checking of applications prior to submission for attachments.

Congress passed the agriculture budget relatively early this year. Funding is level for most USDA programs, including the Regional IPM Centers. This should mean the Western IPM Center will be funded for the last year of the current four-year grant.

The National Institute of Food and Agriculture (NIFA) has established the following priorities. It will be important for researchers and extension personnel to keep these in mind when applying for grants. Whenever possible, bring these into your proposals.

Global Food Security and Hunger. NIFA supports new science to boost U.S. agricultural production, improve global capacity to meet the growing food demand, and foster innovation in fighting hunger by addressing food security for vulnerable populations.

Climate Change. NIFA-funded projects create the scientific information so producers can 1) plan and make decisions to adapt to changing environments and 2) sustain economic vitality and take advantage of emerging economic opportunities offered by climate change mitigation technologies.

Sustainable Energy. NIFA contributes to the President's goal of energy independence with a portfolio of grant programs to convert biomass to biofuels, design optimum biomass for bioenergy production, and produce value-added bio-based industrial products.

Childhood Obesity. NIFA-supported programs ensure that nutritious foods are affordable and available and that individuals and families are able to make informed, science-based decisions about their health and well-being.

Food Safety. NIFA food safety programs work to reduce the incidence of food-borne illness and provide a safer food supply by addressing and eliminating causes of microbial resistance and contamination, educating consumer and food safety professionals, and developing food processing technologies.

—Rick Melnicoe

Western IPM Center 2009 Funded Projects

The Western IPM Center funded four "Addressing Western IPM Issues" projects, three work groups, one survey, and six publication/outreach projects, totaling $213,788.

Addressing Western IPM Issues

Outreach to Preserve Pheromone Mating Disruption Programs in California and Oregon Pear Orchards
Principal Investigator: Rachel Elkins, University of California

Developing and Delivering an IPM Program for Mountain Pine Beetles Attacking High Value Urban Trees
PI: Kevin Wanner, Montana State University

Pre- and Post-Harvest Drenches Containing Essential Oils to Control Eggs of Pest Slugs and Snails in the Growing Medium of Potted Plants
PI: Robert Hollingsworth, U.S. Pacific Basin Agricultural Research Center, Hawaii

Polk County Nutria Control Research Project
PI: Jackie Hastings, Polk Soil and Water Conservation District, Oregon

Work Groups

Crop Pest Losses and Impact Assessment Work Group
PI: Al Fournier, University of Arizona

Southeastern Arizona-Southwestern New Mexico Noxious Weed Work Group
PI: Kim McReynolds, University of Arizona

Work Group Formation for the 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

Survey

Utah Tree Fruit IPM Implementation Survey
PI: Marion Murray, Utah State University

Publications/Outreach

Innovative Outreach for City Parks to Implement IPM Strategies
PI: Shelly Connor, Northwest Coalition for Alternatives to Pesticides, Oregon

Translation of the University of California Touch-Screen IPM Kiosk into Spanish
PI: Mary Louise Flint, University of California

Development of IPM Outreach Materials for Utah and Colorado Tree Fruit Growers
PI: Marion Murray, Utah State University

Demonstration and Implementation of IPM in the Production of Bedding and Container Color Plants
PI: Michael Parrella, University of California

Multimedia Bilingual English and Spanish Publications on Vineyard Pests
PI: Lucia Varela, University of California

Idaho Pest Management Center IPM
PI: Ronda Hirnyck, University of Idaho

Rick Melnicoe

Development and Demonstration of Integrated Systems for Control of Soilborne, Foliar, and Viral Diseases of Potato

PI: Barry Jacobsen, Montana State University

Summary: Montana-produced certified seed potatoes account for more than 50% of the seed used to plant the entire Columbia Basin (Washington and Oregon) and plant considerable acreage in Idaho, California, Wisconsin, Minnesota, and Michigan. Consequently, the health of Montana's potato crop affects potato crop health and yields across multiple states. The Pest Management Strategic Plan for Pacific Northwest (PNW) Potato Production and the Potato Crop Profiles for Idaho, Washington, and Colorado all identify management of early blight, Rhizoctonia and black dot as high priorities. As a seed-producing state, Montana has a particular interest in control of these tuber-borne diseases, as well as scab and the potato viruses, such as Potato Virus X (PVX) and Potato Virus Y (PVY). Alternative disease management strategies, including biological control, pesticide resistance management, control of black dot in seed, and optimization of treatment schemes for Rhizoctonia black scurf and canker, have been specifically identified as high research priorities in the strategic plan and state potato crop profiles.

Barry Jacobsen

Dr. Nina Zidack, Director, Montana Seed Potato Certification Program, giving a presentation to Montana potato seed growers at day-long IPM workshop.

The foliar biological control agent *Bacillus mycoides* isolate J (BmJ) controls disease by inducing systemic resistance in plants to pathogen attack. This results in the potential for disease control of a wide array of pathogens including fungi, bacteria, and viruses. BmJ is under commercial development. This project's objectives were to 1) evaluate the potential of foliar applications of BmJ for control of PVX and PVY; 2) assess biological and chemical treatment regimes for control of foliar and soilborne diseases in the field; 3) demonstrate relative effectiveness of biological and integrated disease management systems to potato growers in on-farm trials; and 4) facilitate adoption of biological controls by key producers.

Results: *Objective 1:* In field and greenhouse trials BmJ-induced resistance (BmJ applied at emergence, then at 14-day intervals) reduced PVY infection by 56% (field) and 55% (greenhouse). BmJ did not reduce PVX infection in greenhouse trials. *Objective 2:* Yield of all biologically- and chemically-based systems was statistically superior to the non-treated system. Potato scab and Rhizoctonia canker control was equivalent for all treatments and was superior to non-treatment. Black dot was only controlled in the chemically-intensive system and the integrated (biological and chemical) systems. In early blight trials, BmJ alone was better than non-treatment. Integrated programs alternating BmJ with fungicide treatment were better than the fungicides alone and superior to a chlorothalonil program. Forty-seven potato cultivars were evaluated for black dot resistance. Cultivars with resistance showed no or very small responses to the standard chemical black dot control, whereas cultivars identified as susceptible showed as much as 40% yield increase from chemical black dot treatment. *Objective 3:* Demonstrations showed BmJ treatment integrated with chemical treatment provided equal control of early blight when compared to a program where two chemicals were used in alternation. Five grower field meetings were held at the demonstration sites. *Objective 4:* Three Montana Potato Improvement Association Annual meetings and a 6-hour intensive potato IPM training meeting for potato seed growers were held. Montana growers have adopted integrated control programs for control of potato scab, and they have adopted the use of BioSave (*Pseudomonas syringae* isolate EC10) for control of silver scurf, soft rot, and Fusarium dry rot. When BmJ is fully approved, growers will use it in early blight and virus control programs.

Impacts and Potential Impacts: This research and demonstration project has clearly demonstrated that fungicide use can be reduced without sacrificing either yield or control of scab, Rhizoctonia canker, black dot, or PVY. The new control for PVY using BmJ-induced resistance represents a totally new control concept. Virus control using BmJ or other inducer of plant resistance could potentially reduce the use of insecticides by potato seed producers. The identification of black dot resistance may allow growers to use chemical controls more selectively for black dot and may encourage potato breeders to include black dot resistance as an objective.

Research and Extension on Integrated Biological and Cultural Management of Canada Thistle

PI: Fabian Menalled, Montana State University

Summary: Canada thistle (*Cirsium arvense*) is an aggressive, creeping perennial weed that infests crops, pastures, rangelands, roadsides, and non-crop areas throughout the northern and western United States. In Montana, Canada thistle is a Category 1 noxious weed that infests approximately 1.5 million acres. The weed is particularly hard to control because of its deep, creeping, and reproductive root system, its colony-forming tendencies, and its high seed production potential. Stakeholders have expressed concern about the lack of viable management options for Canada thistle. The main goal of this project was to evaluate if the joint use of pathogens, insects, and herbicides could provide efficient, economically durable, and environmentally benign management of Canada thistle. Project objectives were to 1) assess the individual and combined effect of stand density and two biological control agents (the bacterium, *Pseudomonas syringae* pv. *tagetis*, and the stem gall fly, *Urophora cardui*) on the growth and reproductive output of Canada thistle; 2) evaluate if infestation of Canada thistle plants by *P. syringae* and the use of herbicides modifies the behavior and performance of the stem gall fly; and 3) develop and deliver extension material on the integrated

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Joanna Sciegienka, Montana State University

Greenhouse study evaluating the joint impact of herbicides and two biological control agents on the emergence and growth of Canada thistle.

State Briefs

Utah Pests Welcomes New CAPS Coordinator

Cory Vorel began as the new Utah State University Cooperative Agricultural Pests Survey (CAPS) Coordinator in October, 2009. Along with Clint Burfitt, the Utah Department of Agriculture and Food CAPS Coordinator, Cory co-administers this program, which monitors for invasive pests throughout the state. In addition, Cory is teaching a variety of workshops, writing fact sheets, and participating in other Extension activities. She recently attended a conference on thousand cankers disease of walnut trees, an emerging threat to black and English walnuts.

Cory is originally from Ogden, Utah and received her B.S. in zoology from Weber State University. More recently, she completed her doctorate with the Department of Biology at Utah State University. Her dissertation research was completed at the USDA-Agricultural Research Service Bee Biology and Systematics Laboratory in Logan, where she studied learning, nest selection, and dispersal of solitary bees. You can contact her at ***cory.vorel@usu.edu***.

Utah Specialty Crop Grant Funding on the Rise

The Utah IPM program will be busy the next few years, having received almost $250,000 in research funding last fall from a variety of sources including EPA, the Utah Department of Agriculture and Food (Specialty Crop Block Grant Program), the Western IPM Center, and the USDA-National Institute of Food and Agriculture Organic Agriculture Research and Extension Initiative. The research projects are focused on fruit pest management and include cane-boring insect management and biology, a peach disease survey, real-time fire blight detection, cherry fruit fly management alternatives, European earwig monitoring and management, and groundcovers for arid stone fruit organic production. Other identified state needs include establishing an IPM outreach program for an underserved and low-IPM-adoption group of fruit growers, developing a multi-state fruit production guide and Web site, and conducting an IPM survey of Utah tree fruit growers.

New Director for UC Statewide IPM Program

Kassim Al-Khatib has been named director of the University of California Statewide Integrated Pest Management Program (UC IPM), effective January 19. His new appointment is 25 percent professor in the UC Davis Department of Plant Sciences and 75 percent Cooperative Extension specialist as director of UC IPM. Al-Khatib has been a professor of weed science at Kansas State University since 1996. From 1989 to 1996, he was an assistant horticulturist/agronomist, then a weed specialist for Cooperative Extension at Washington State University, where he served as director of the Western Washington IR-4 Field Research Center from 1993 to 1996. He is past president of the Council for Agricultural Science and Technology and past president and current fellow of the Western Society of Weed Science. Al-Khatib is also a fellow of the American Society of Agronomy and the North Central Weed Science Society. He has authored or co-authored three books and 84 peer-reviewed publications and holds two patents related to sorghum. He earned his Ph.D. from Kansas State University and his Bachelor and Master of Science degrees from the University of Baghdad.

Adapted from ANR Report*, December 2009*

Decline in Pesticide Use in California

Pesticide use declined in California for a third consecutive year in 2008. Approximately 162 million pounds of reported pesticides were applied statewide, a decrease of nearly 10 million pounds—or 6 percent—from 2007. Pesticide use in production agriculture fell by 9.6 million pounds, and it fell in most other categories as well, including structural pest control and landscape maintenance.

Western SARE Subregional Conference Held in California

Priorities that could sustain California agriculture include:

1. Conduct feasibility studies on local and regional food distribution, economics, facilities, and processing.
2. Encourage farmer-to-farmer education, networking, and learning opportunities.
3. Apply whole-system and interdisciplinary research and education approaches to issues like water conservation, soil and crop nutrients, soil management, conservation, integrated natural resource management, and life cycle analyses.

These priorities, along with developing partnerships to engage underserved communities and engaging youth in sustainable agriculture, were among those expressed by participants at the Western SARE California Subregional Conference, held December 1–3 in Visalia. The conference was the sixth of seven that Western SARE is conducting to showcase SARE accomplishments and elicit grassroots response on the needs and issues that can extend sustainability to the whole of American agriculture. The Western SARE Administrative Council (board of directors) will consider the California priorities, along with those from other subregional conferences, in funding decisions on SARE's competitive grants. The California priorities (more than 400 separate comments were recorded during facilitated roundtable discussions) reflected comments by guest speakers invited to share their vision with the nearly 100 conference participants. For details, visit ***http://wsare.usu.edu/news/pdf/WS1_2010_153834.pdf***.

From Simply Sustainable*, December 2009*

PMSP Update

Ongoing:

- **Citrus (California)**
- **Desert Turf (Arizona, Nevada, and Southeastern California)**
- **Grass Seed (Idaho, Oregon, and Washington)**
- **Low Desert Cotton (Arizona and Southeastern California)**
- **Pear (California):** Being updated
- **Turf (Hawaii)**

Completed:

- **Caneberry (Oregon and Washington):** Completed in June 2009
- **Christmas Trees (Oregon and Washington):** Completed in August 2009
- **Winegrape (California):** Updated August 2009
- **Coffee (Hawaii):** Completed in February 2010

See completed PMSPs on the National IPM Center's Web site at ***http://www.ipmcenters.org/pmsp/index.cfm***.

Rick Melnicoe

PROFILE

By Diane Clarke

Steve Ela

Operations Manager and Partner, Ela Family Farms

A deep commitment to the environment has been a way of life at Ela Family Farms for four generations, ever since Steve Ela's great-grandfather planted the family's first fruit trees in 1907. After Steve took over as the farm's operations manager 83 years later, he continued and deepened that commitment by starting to convert the farm to organic production in 1994. The farm is now 100% organic. "We had planned to be as sustainable as we could, not necessarily organic, but then we realized we were there! At this point I don't think I would go back," said Steve.

Becky and Steve Ela (right), with their children, Will and Adair, and Steve's parents, Bill and Shirley Ela

Since 2007, the Western IPM Center (WIPMC) has benefited from Steve's rich experience and knowledge of organic production as he has participated on the Advisory Committee, which offers vision and guidance to the WIPMC about stakeholder needs and priorities in the West. "Steve provides a unique and valuable perspective as the only member representing organic production," said WIPMC Director Rick Melnicoe. Rick and Associate Director, Linda Herbst, have also appreciated Steve's perspective and input on relevancy panels for WIPMC grants. For Steve's part, he says it is "nice to know what the playing field is like out there. Participation on the committee has helped me to get feedback into some of our local groups about what's out there, what's going on." He added, "IPM is integral to organic production. Without IPM, you can't do organic."

Although Colorado is not inherently a fruit-growing area, the microclimate of Ela Family Farms, located on the western slopes of the Rocky Mountains outside of Hotchkiss, is just right for producing wonderful tasting fruit, according to Steve. This is largely thanks to the diurnal temperature variations: it can be 90°F during the day and then dip down to 50°F at night. Steve says these wide swings are ideal for producing the best fruit taste and color. Sitting at an elevation of 5,800 feet, the 99-acre farm's biggest growing challenge is spring frost, which hinders production more than any other factor. The farm receives just 10 inches of annual rainfall, so they irrigate everything. They have converted their entire irrigation system from flood to micro sprinkler or drip.

Steve and his family grow peaches (16 varieties), apples (21 varieties, including seven heirloom), pears, cherries (three varieties), grapes, strawberries, raspberries, blackberries, and heirloom tomatoes. They also process the fruit into jams, fruit butters, apple sauces, and ciders, and they recently installed a dryer and now produce dried apples and peaches. All of the farm's products are certified organic and are made only from fruit they grow on the farm.

Knowing that consumers seek individual apple varieties for their unique flavors, Ela Family Farms decided to develop a line of single-variety apple sauces: Just Jonathan, Gala Gala, Fully Fuji, and Boldly Braeburn. They also produce a "medley" apple sauce, Apples Aplenty, made from five varieties, which was rated "best sweet" apple sauce by Real Simple magazine in May, 2007. That was in spite of the fact that they do not add sweeteners to any of their apple sauces.

In addition to shipping fresh fruit gift packs and gift packs of their processed goods throughout the country, the farm sells directly at farmers markets in the Denver, Boulder, Golden, and Fort Collins areas; provides "fruit shares" to several Community Supported Agriculture operations; and sells wholesale to specialty food stores and gourmet restaurants throughout Colorado.

As operations manager, Steve oversees the day-to-day goings-on of the farm. On any given day this might include planting new cherry trees, changing tractor tires, putting together gift baskets, or marketing fruit. Steve is very active in promoting the fruit industry. He served as a member of the Colorado Agriculture Commission and as president of the Western Colorado Horticultural Society. He also serves on numerous local boards and organizations and speaks at conventions, seminars, and other meetings.

Steve is involved in organic tree fruit research in a number of ways. He helped organize two major national organic tree fruit research symposia. He is on the board and was board president of the Organic Farming Research Foundation. Additionally, he has collaborated with Colorado State University on several organic research projects on the farm. Subjects have included codling moth mating disruption, organic apple thinning strategies, organic weed control methods for apple trees, and efficacy of the biofungicide AQ10. Steve's involvement in these projects has ranged from letting researchers use some of his trees to participating in writing the grant proposals, executing the projects, and writing research reports. All of these projects have been relevant to questions Steve has or to decisions he is trying to make on the farm for which he needs additional information. The research projects are one of the many ways Steve makes sure that he keeps learning about organic fruit production. "You can't grow in a vacuum," he says. He keeps up on the published research, attends pest management conferences, cultivates friendships around the country with growers and researchers, and tries things out on the farm. And Steve talks to all kinds of growers, not just organic fruit growers. He says, "It's amazing how many ideas you can get cross-discipline." But much more research is needed: organic production is seven percent of the market, but it only gets two to three percent of the research money, according to Steve.

Steve's favorite thing about organic farming is how it forces him to take an ecosystem approach. "We don't have all the tools a conventional farmer would have," he observed. "So, you look at what you have, and at what your other options are. How can I change the environment I'm working in to make it less enticing for this pest?" Steve likes how this approach compels him to look at the ripple effects of management decisions. "You quit looking at the magic bullet solutions that often have unintended consequences. You look at longer-term solutions," he said. "The older I get, the more I realize how little we know. We assume we know more than we do. On our farm we try to let the system do the work, and then we intervene when we have to," said Steve. He feels we are entering a new, wiser era of pest management in which biological treatment is the emphasis. "We are getting back to a better understanding of the world—an understanding that there are a lot of things already out there that we can use to make life better," he said.

> ***"The older I get, the more I realize how little we know. We assume we know more than we do. On our farm we try to let the system do the work, and then we intervene when we have to."***

Steve earned his B.S. degree in biology and environmental geology from Beloit College, in Beloit, Wisconsin, and his M.S. degree in soil science, with a minor in water resources, from the University of Minnesota. Steve's wife, Becky, works off the farm, directing a domestic violence center. Their two children are Will, who is 8, and Adair, who is 6. Steve's mother, Shirley, who is in her mid eighties, still helps with the books. Bill, Steve's father, volunteers as a helping hand, digging and planting, and picking and packing fruit. Steve says he and Becky will be happy with whatever Will and Adair decide about continuing the family business. "We've got a while. But if either or both want to, great. If not, so be it," he said. Steve's personal interests include ultra-marathons and mountain running, Nordic skiing, hiking and backpacking, reading, and travel.

Contact Steve Ela at **sela@tds.net**. *Visit the Ela Family Farms Web site at* **http://elafamilyfarms.com**.

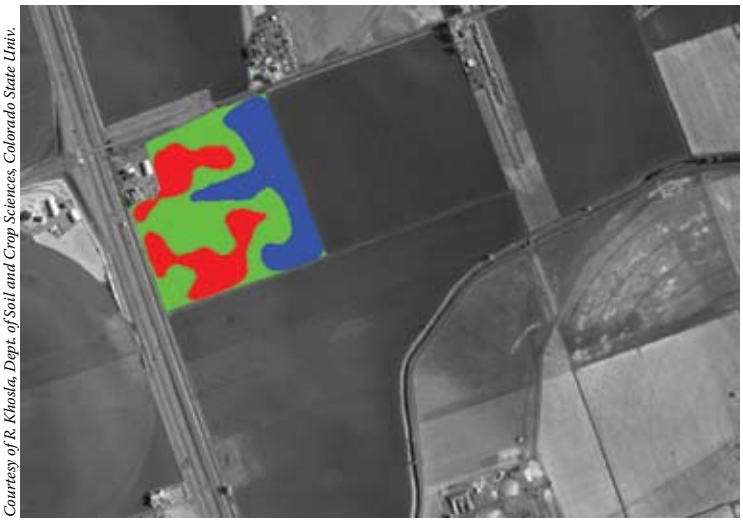
management of Canada thistle. Investigators hypothesized that, while each treatment would have a negative effect on Canada thistle growth, the integrated strategies would have higher impact than individual control methods.

Results: Instead of stand density (Objective 1), investigators used herbicide, and instead of using the stem gall fly, they used the stem-boring weevil, *Hadroplontus litura*. In addition, they monitored Canada thistle emergence and growth, not reproductive output. Investigators detected additive but not synergistic interactions among management tactics. They also found one antagonistic interaction (between glyphosate and one of the biological control agents). Results showed that a reduced rate of glyphosate had the same effect as a full rate on Canada thistle in a fallow field and had similar effects as a full rate in the greenhouse. In numerous extension presentations and agricultural station field days the experimental methods and results were shared in detail. Investigators provided management recommendations for Canada thistle and published the research findings. The results show that integrated methods work equally well or more effectively than the best individual management practices.

Impacts and Potential Impacts: This study set a precedent, demonstrating the importance of testing the existence of interactions among several control practices. Although previous studies have evaluated the combined use of two single control methods for Canada thistle control, the literature is lacking in studies detailing interactions between insects and herbicides and interactions among more than two control practices, especially an insect, herbicide, and pathogen. Investigators tested a novel combination of agents to see how they would perform in an integrated weed management plan. Combinations of these agents could be used anywhere there is an infestation of Canada thistle, including agriculture, range, or smaller settings such as gardens. The study's positive results with reduced glyphosate rates could encourage managers to decrease the use of herbicide and use it as part of an integrated weed management strategy that combines tactics for higher control efficacy. The use of insects and pathogens could decrease impacts on human health compared to traditional chemical methods. Investigators believe that reducing herbicide rates and combining them with biological controls could prove to be more economical in the long run. Through extension publications and presentations throughout Montana, investigators reached a wide audience, with potential for even more exposure.

Yield Losses for Western Bean Cutworm and European Corn Borer among Site-Specific Management Zones

PI: Frank Peairs, Colorado State University



Courtesy of R. Khosla, Dept. of Soil and Crop Sciences, Colorado State Univ.

A 20-acre field at the Colorado State University Agricultural Research Education and Development Center was categorized into low- (red), medium- (green), and high-yield (blue) potential (or site-specific management) zones, based on soil color and topography.

Summary: Site-specific management zones are areas within fields that have similar yield potential and are managed in a similar manner. These zones have been developed to define areas of high, medium, and low productivity. Site-specific insect management has the potential to make pest management more efficient. One method of implementing site-specific insect management is to make decisions at the site-specific management zone level. Potential benefits of site-specific insect management include 1) effective control of insects, 2) reduction in the amount and costs of insecticides applied, 3) reduction in environmental contamination, 4) preservation of natural enemies, and 5) better management of insecticide resistance. This study was conducted in a corn (*Zea mays* L.) agroecosystem with four pests: western bean cutworm (*Striacosta albicosta* [Smith]), European corn borer (*Ostrinia nubilalis* [Hübner]), and two spider mite species (*Oligonychus pratensis* [Banks] and *Tetranychus urticae* [Koch]). The objective of the study was to develop site-specific management zone loss factors (i.e., amount of yield lost per pest) and economic injury levels for important pests of corn in Colorado.

Results: Results for European corn borer and spider mites showed that site-specific management zones are an impractical way to define pest management zones for these species. However, site-specific management zones show excellent potential for managing western bean cutworm. Additional research is being applied to develop quality loss factors for the western bean cutworm that would enhance IPM strategy options.

Impacts and Potential Impacts: Management zones based on other factors, such as soil characteristics, may still be of value. If management zones could be developed for these pests, the economic and social benefits would be significant. Site-specific management zones appear to have exceptional promise for control of western bean cutworm. If loss factors for this pest can be developed, substantial benefits, both directly to the producer and indirectly to the community, could be observed. Site-specific insect management shows great potential for significantly enhancing pest management efficiency.

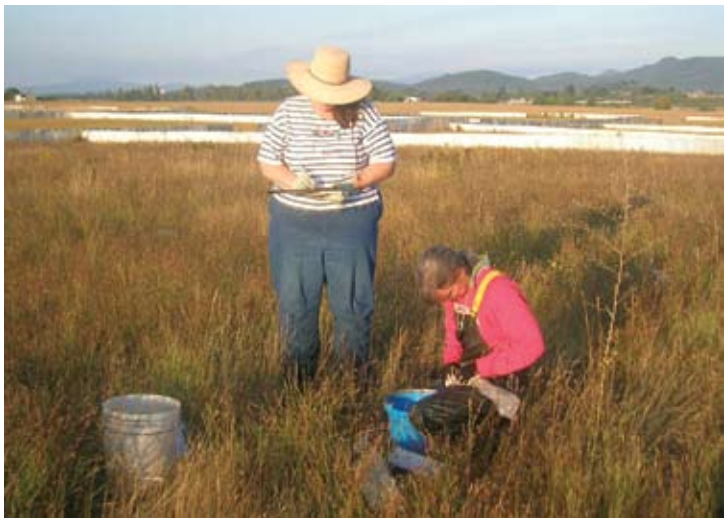
Developing a Monitoring Strategy for Voles in Agriculture

PI: Jennifer Gervais, Oregon State University

Summary: Voles are a difficult crop pest for growers to manage because of the wide fluctuations in their population numbers. Voles typically exist at lower densities that do not cause substantial damage, but at times their populations build to levels that cause widespread crop losses. If control measures are undertaken before voles begin to build rapidly, population peaks may be either averted or lessened, with a corresponding decrease in crop losses. The goal of this project was to test various methods of monitoring vole population density by measuring their signs, such as burrow entrances and runways. If farmers had a reasonably simple, precise way of determining vole numbers, they could

Jennifer Gervais

Vole burrow with fresh droppings and signs of recent herbivory.



Vole trapping.

monitor populations and begin taking steps to control them early in the growth phase of an outbreak. The investigator tested line transect and quadrat survey methods, and for each type of survey, she tested whether counting holes, runways, droppings, or cut or grazed vegetation gave a reasonably good idea of how many voles were present. She also trapped voles in study enclosures to estimate population size. The objective of this project was to develop an easy-to-use monitoring technique for growers that would help them determine when populations had reached levels that could be damaging if not controlled. The methods evaluated were designed to be easy to implement by anyone with little training, and they used only materials that would be readily available.

Results: Although the first night of trapping gave a good indication of how many voles were present, none of the other methods performed well, particularly in situations where the grassland was mowed earlier in the season. The methods tested had limited utility in grassland plots that were not mowed because of poor precision. None of the methods showed any consistent relationship with the voles' actual population size in plots that had been mowed, which were most similar to fields of grass grown for seed. Of the methods tested in this study, only monitoring population size through periodic trapping appeared to have any utility for improving IPM for voles in grass seed production systems.

Impacts and Potential Impacts: The greatest impact of this research has been the demonstration that the common practice of counting holes to determine vole population size is highly unreliable and should not be used as the deciding factor in whether or not to apply poison bait. This may lessen both the frequency of unnecessary rodenticide use and the incidence of vole population growth being monitored for but missed because an unreliable cue is being used. Since monitoring vole burrow density is clearly not a good method of determining changes in activity, this may spur the development of other methods growers can use that are efficient and cost-effective so that field scouting for voles could become a regular practice. In the interim, growers have become aware that relying on burrow counts may lead to unnecessary baiting with its associated financial and environmental costs. Although it is less likely, burrow counts may also lead to underestimates of vole density, leading to crop damage if growers do not bait. Recognition of the limitations of this practice should help reduce unnecessary bait use and reduce risks of economic losses due to vole damage. These results were disseminated to, among others, the conservation community, which in this region is particularly concerned with rare plant conservation and prairie restoration. Voles can be a significant threat to restoration efforts or to rare plants, and recognizing the limits of monitoring tools is important to planning when intervention is needed to protect restoration projects or focal plants.

A New IPM Delivery Method to Increase Adoption Rates

PI: Ronda Hirnyck, University of Idaho

Summary: The need for a crop/pest/IPM practices matrix came about during a discussion between project investigators and USDA Natural Resources Conservation Service (NRCS) staff. As NRCS began implementing additional IPM requirements for their programming, especially the Conservation Security Program (CSP), the need for a simple IPM planning tool and resources became imperative. The CSP requires producers to provide documentation demonstrating that IPM practices have been implemented for the two years prior to program enrollment. Producers also need a mechanism to produce a basic IPM plan. The investigators had been working with the WIPMC-funded OnePlan IPM Planner Work Group to develop a much more detailed planning tool; however, that project was to take three years or more to complete. In the interim, NRCS needed a tool that would provide adequate IPM resource material and suffice as a simple planning tool to use with their programming, especially the CSP. NRCS, the Idaho Association of Soil Conservation Districts, and University of Idaho personnel agreed to jointly develop a matrix to provide basic IPM information and additional resources for the major commodities of Idaho and their major pests. The matrix could be utilized by other PNW states within the same growing region with the same commodities, pests, and agronomic practices. Project objectives were to 1) develop a crop/pest/IPM practices matrix to assist NRCS with IPM outreach and cropland program enrollment for major commercial commodities in Idaho; 2) deliver the matrix in an electronic format with links to additional resources; 3) provide the matrix to producers and NRCS staff for 2006 NRCS programs; and 4) measure the utility of the matrix and the level of IPM practice adoption.

Results: The matrices were completed for potato and small grain and are being formatted for posting to the Web site. Investigators worked with NRCS state office staff to provide some initial tools for their use and provided pest management training to the NRCS field staff.

Impacts and Potential Impacts: Because of investigators' work with NRCS and some commodity groups utilizing the pest management information of the matrix, Idaho paid for pest management on 25 contracts. This was the first time that was accomplished. Investigators have not measured the adoption rate of use of the matrix. However, some NRCS staff have used the matrix information to help them discuss IPM options with producers. They believe that more educational efforts and the addition of the Web interface with the OnePlan IPM planner will eventually expand the use of this material. NRCS implemented a cost share program for pest management, and having the matrices available encouraged that decision.

Wayne Jones, University of Idaho

Teaching field workers how to scout for pests, the foundational element of the IPM project.

Investigating the Connections between Integrated Pest Management and Water Quality

A Symposium held in conjunction with the
Pacific Branch Entomological Society of America
Boise, Idaho
April 13, 2010
8:00 AM to 5:00 PM

Please join us for a one-day Symposium to address the connections between integrated pest management (IPM) and water quality.

Speakers: The Symposium will feature a keynote speaker from USDA/National Institute of Food and Agriculture, and a variety of IPM, water quality, and social science experts from around the western region.

Joint Projects and Possible Funding Opportunities: The Symposium will also feature small group discussions to determine emerging issues and potential joint projects. Small groups will help to determine outputs, desired outcomes, and potential impacts of new projects and explore possible funding opportunities.

Registration: Online registration is now open. Please go to ***http://ipm.wsu.edu/PBESA/*** for meeting, hotel, and registration information. The Symposium is listed with a separate registration fee of $75.00 for the day.

Rick Melnicoe

Mark Your Calendar

2010

February

- 24th Vertebrate Pest Conference, February 22–25, Sacramento, California.
  http://www.vpconference.org

March

- 56th Annual Soil Fungus Conference, March 22–24, Mount Vernon, Washington.
  http://soilfungus.ars.usda.gov/
- International Drought Symposium, March 24–26 Riverside, California.
  www.cnas.ucr.edu/drought-symposium/

April

- Pacific Branch Entomological Society of America, April 11–13, Boise, Idaho.
  http://ipm.wsu.edu/PBESA
- IPM and Water Quality Symposium (Breakout session of PBESA), April 13, Boise, Idaho.
  http://ipm.wsu.edu/PBESA

May

- 2010 WERA-069, May 18–19, Logan, UT.
  Contact Diane Alston, ***diane.alston@usu.edu***.

June

- 2010 International Groundwater Conference, June 15–17, Burlingame, California.
  http://www.watereducation.org/doc.asp?id=1231&parentID=849
- 2010 Joint Annual Meeting and Conference Canadian Phytopathological Society with the Pacific Division of the American Phytopathological Society, June 20–23, Vancouver, British Columbia.
  http://www.cps-scp.ca/index.shtml

August

- 95th Annual Ecological Society of America Meeting, August 1–6, Pittsburgh, Pennsylvania.
  http://www.esa.org/pittsburgh/

September

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

December

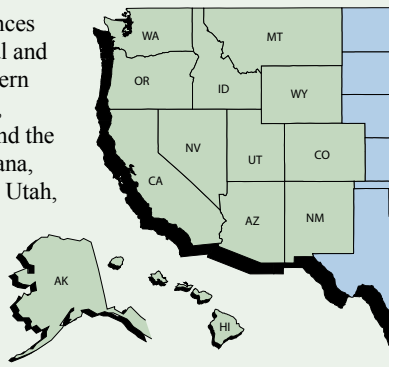
- Entomological Society of America 58th Annual Meeting, December 12–15, Town and Country Hotel & Convention Center, San Diego, California.
  http://www.entsoc.org/am/fm/index.htm

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

Rick Melnicoe

Center Scope

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



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