Pesticide Use and Risk Reduction:

An Investment in the Future of Wisconsin Agriculture

A special report to the Wisconsin legislature

A project coordinated by the **Center for Integrated Agricultural Systems** (CIAS)
at the College of Agricultural and Life Sciences, UW-Madison
Michelle Miller, Project Coordinator

June 2003

Pesticide Use and Risk Reduction Project Partners

Non-governmental organizations
Michael Fields Agricultural Institute
Wisconsin Apple Growers Association
Wisconsin Association of Professional Agricultural Consultants
Wisconsin Berry Growers Association
Wisconsin Corn Growers Association
Wisconsin Farm Bureau Federation
Wisconsin Farmers Union
Wisconsin Federation of Cooperatives
Wisconsin Fresh Market Vegetable Growers Association
Wisconsin Ginseng Growers Association
Wisconsin National Farmers Organization
Wisconsin Potato and Vegetable Growers Association
Wisconsin Rural Development Center
Wisconsin Soybean Association
Wisconsin State Cranberry Growers Association

State of Wisconsin
University of Wisconsin-Madison College of Agricultural and Life Sciences
Wisconsin Department of Agriculture, Trade and Consumer Protection
Wisconsin Department of Natural Resources

Federal agencies
U.S. Department of Agriculture
U.S. Environmental Protection Agency

Executive Summary

The Pesticide Use and Risk Reduction (PURR) Project was initiated in 1998 to help farmers anticipate the effects of more restrictive federal pesticide regulation through research and outreach. The Pesticide Overcharge Fund administered by the Wisconsin Department of Justice funded the PURR Project through June 2002. The Project is currently operating with funds from a Federal grant.

Fourteen agricultural organizations participated in this project. These project partners included the Wisconsin Farmers Union, the Wisconsin Farm Bureau Federation, NFO and many commodity groups (see list at lower left). The project was coordinated and administrated by the Center for Integrated Agricultural Systems (CIAS) at the UW-Madison College of Agricultural and Life Sciences.

The PURR Project, similar to the state-funded program at Michigan State University, built new, lasting partnerships between the participating institutions, farm organizations and nonprofit groups. As a result of these partnerships and the resources invested by the project, the following outcomes were realized:

PURR Project Partners
Michael Fields Agricultural Institute
US Department of Agriculture
US Env. Protection Agency
University of Wisconsin College of Agricultural and Life Sciences
Wisconsin Apple Growers Assoc.
Wisconsin Assoc. of Professional Agricultural Consultants
Wisconsin Berry Growers Assoc.
Wisconsin Corn Growers Assoc.
Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection
Wisconsin Farm Bureau Federation
Wisconsin Farmers Union
Wisconsin Federation of Cooperatives
Wisconsin Fresh Market Vegetable Growers Association
Wisconsin Ginseng Growers Association
Wisconsin National Farmers Organization
Wisconsin Potato and Vegetable Growers Association
Wisconsin Rural Development Center
Wisconsin Soybean Association
Wisconsin State Cranberry Growers Association

Participants identified common goals on issues of pest management, and worked together to research and address these issues. Hearing how each commodity group viewed federal pesticide regulations was critical for developing a cohesive Wisconsin strategy for IPM and pesticide reduction.

Wisconsin's agricultural sector was granted access to additional resources to address pest management research and outreach needs. The initial grant from the Department of Justice was used to leverage over $492,000 in additional funds from the Environmental Protection Agency (EPA), Pesticide Environmental Stewardship Program (PESP), and US Department of Agriculture – Cooperative State Research and Extension Education Service (USDA-CSREES). ***See page 1 for a complete list of additional funds leveraged.***

Wisconsin producers increased their IPM knowledge. The PURR Project supported workshops, on-farm trials, field guides, scorecards, roadside signs, and the Think IPM Web site. These outreach efforts are helping thousands of growers across the state implement IPM on their farms. Over the long-term, the IPM practices promoted through this project can help farmers reduce input costs and earn higher prices for their products, which will ultimately benefit Wisconsin's farm economy.

Project researchers and their farmer-clients learned about the effectiveness of biological, cultural, physical, and low-risk chemical controls for pests. Federal regulations will potentially limit or eliminate some traditional pest control measures. PURR Project research has provided information that will help Wisconsin agriculture sustain or increase its productivity and profitability under a more constrained regulatory environment.

Introduction

Like many business and government leaders, Wisconsin farmers are looking for new ways to succeed in a changing economic and regulatory climate. They're also concerned about their working conditions, family health, and long-term health of their land. Tight margins, consumer concerns about health and the environment, and new federal regulations such as the Food Quality Protection Act (FQPA) are leading farmers to seek innovative ways to cut costs, increase profits and reduce their dependence on high-risk pesticides.

Many Wisconsin farmers are turning to Integrated Pest Management, or IPM, to reduce their reliance on high-risk pesticides. IPM is a decision-making process that includes all possible pest control strategies—cultural controls like crop rotation and tillage, biological controls like beneficial insects and mating disruption, physical controls like pruning, and chemical controls like low-risk pesticides. IPM emphasizes low-risk pesticides whenever possible, and crop scouting is a critical means of gathering information for a farm's IPM program.

IPM is a win-win solution for farmers and consumers. Farmers may be able to reduce their input costs, or receive a premium for their IPM grown products, while sustaining the profitability of Wisconsin's agricultural industry. The EPA will continue to cancel or further restrict the use of older and riskier pesticides while registering new chemical approaches to pest control that are safer for farmers and the environment. These new chemicals are usually more expensive to use and may not be registered for use on specialty crops. IPM offers safer new pesticides and non-chemical pest control alternatives that can help Wisconsin's agricultural industry thrive under these new regulations. Reduced pesticide use on farms means fewer pesticides in our ground and surface water. Everybody wins when our water quality improves.

The state investment in IPM was sound. The PURR Project Partners used the Department of Justice funds to provide researchers with small grants for twenty outreach and research projects. The Project Partners leveraged the Department of Justice funds to secure $492,200 in additional funding for pesticide reduction research and outreach. Additionally, individual researchers who received PURR funds used this money to leverage additional grant money for IPM research. For instance, researchers working with the Wisconsin State Cranberry Growers Association raised an additional $275,000 to supplement $71,000 in project grants.

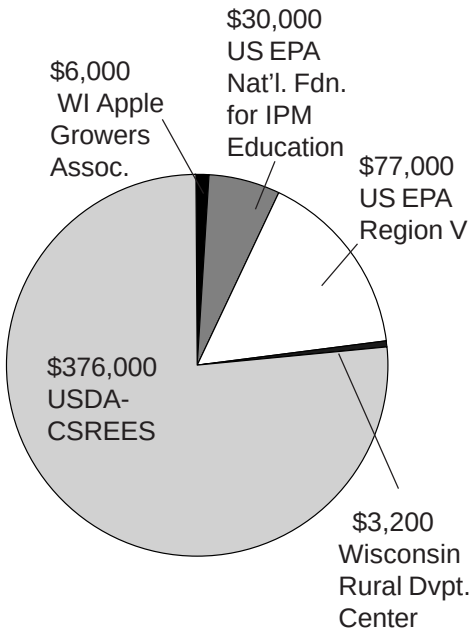
In a nutshell, the Department of Justice funds and additional funding leveraged with this state money have brought about:

- IPM research advances in cranberries, processing vegetables, apples, fresh market fruit and vegetables, and field crops
- Publications, tools, workshops, farmer networks, on-farm activities, and roadside signs providing outreach and education for growers
- A "Think IPM" Web site linking growers with pesticide reduction information: www.thinkipm.org

A Good Investment

For every $100 the state invested in the Pesticide Use and Risk Reduction Project, we generated an additional $98.80 in grants for the project.

Funding from outside sources Total $492,200



PURR accomplished much more than research and outreach. **The project brought together researchers, state agencies, and farm organizations and created opportunities for them to work on pesticide reduction issues.** The project improved communication between these entities and positioned them to help Wisconsin farmers proactively meet new federal pesticide regulations. These partnerships are a key part of helping producers adopt IPM and reduce their reliance on pesticides that pose health risks to Wisconsin's rural communities, our environment and consumers.

Research projects

PURR's work on cranberry farms evaluated ways to reduce pesticide use. (Photo credit: Teryl Roper, UW-Madison)

Cranberries

Industry and UW investigate pesticide alternatives together

While Wisconsin may be known as the "dairy state," perhaps "cranberry state" is just as appropriate a title. Wisconsin leads the nation by producing more than 53% of our cranberries. The value of Wisconsin's crop exceeds $50 million annually.

Blackheaded fireworm, one of the most destructive pests in Wisconsin's cranberry fields, is typically controlled with high-risk, broad-spectrum organophosphates. Unfortunately, these pesticides also destroy beneficial insects that could naturally control cranberry pests. With PURR project support, UW-Madison entomologist Dan Mahr set out to learn if pheromones could control blackheaded fireworm infestations by interfering with this pest's mating patterns. Mahr worked with Wisconsin cranberry growers to evaluate pheromone - mediated mating disruption on four farms.

Preliminary analysis shows that the acres treated with pheromones had reduced blackheaded fireworm populations similar to the acres treated with organophosphates, and the berries suffered no more damage than the fruit sprayed with organophosphates. Additional research is needed to verify these findings and to provide information about how beneficial insect populations fared under the different treatments, and which pheromone delivery method worked best.

More than 1/4 of fresh market farmers surveyed said there is a need for more information on IPM strategies.

Fresh market fruit and vegetables

Understanding growers' pest management strategies

Opportunities to raise fruit and vegetables for urban and suburban consumers are on the rise as Wisconsin grows and urbanizes. And many consumers want fruit and vegetables that are raised with few or no pesticides. The PURR project is helping fresh market growers meet the demands of this growing consumer segment.

To assess pest management strategies used by fresh market growers, UW-Madison rural sociologist Pete Nowak and UW-Extension fresh market specialist Karen Delahaut surveyed Wisconsin's estimated 1,500 fresh market vegetable growers and 300 berry growers. Respondents were 32% organic growers, while 67% used conventional pest management strategies. Highlights from this survey include:

- The majority of growers didn't rely heavily on pesticides as their first line of defense.
- 28% said there is a lack of information on IPM, and 20% had never heard of IPM.
- 90% said that they scout for pests. 40% use crop rotation for insect pest management and 27% use insecticides when risk of crop damage is high.
- 60% hand weed crops and 57% cultivate for weed control. 22% use herbicides as needed.
- 44% use crop rotations to prevent disease and nearly 37% plant disease-resistant plant varieties.

For more detailed survey results visit www.wisc.edu/cias/pubs/briefs/062.html

The coddling moth is the most damaging apple pest in North America.

Apples

Low risk pest and disease control strategies

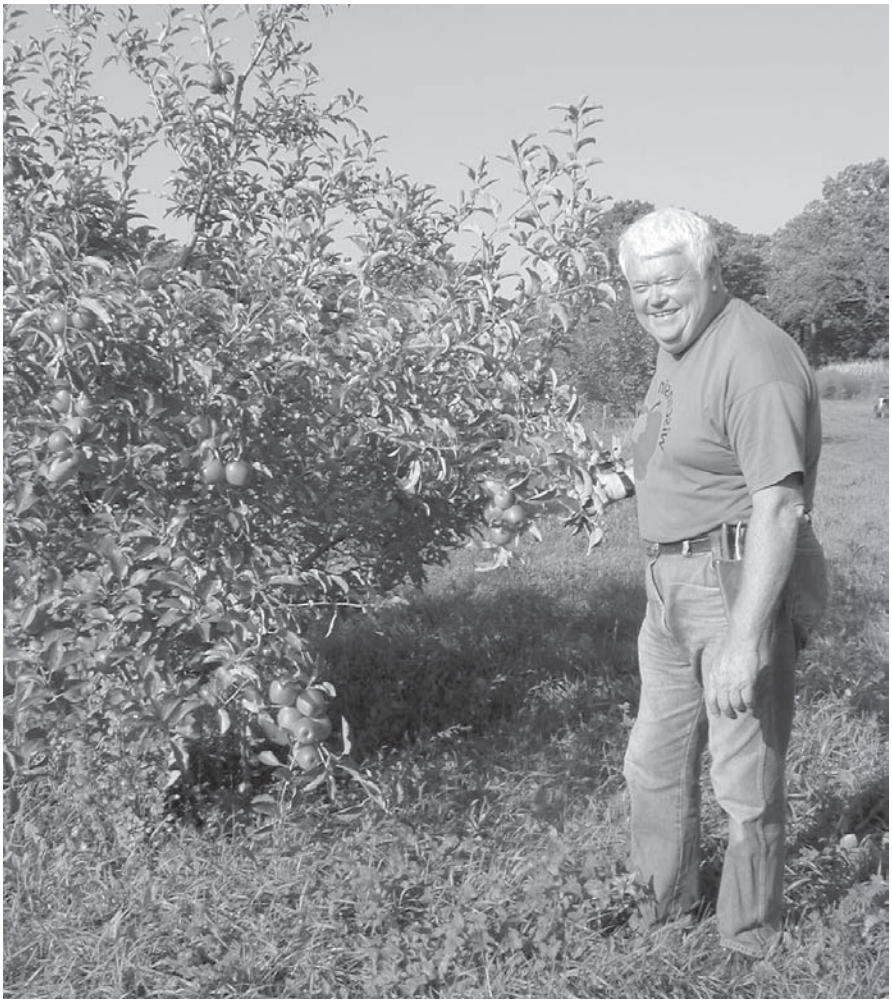
In order to access new markets and possibly offset the higher costs of some lower risk pesticides, PURR and the Wisconsin Apple Growers Association are investigating an eco-label for apples grown under IPM, similar to the Healthy Grown label being adopted by the Wisconsin Potato and Vegetable Growers. *See "The Future" on page 6 for more information about this effort.* Expanding the market for Wisconsin-grown apples is critical to our state's economy, as markets have declined dramatically. According to the USDA Agricultural Census, the number of Wisconsin apple producers has declined 11% and the acreage in apple production has declined 21% since 1987.

An example of PURR-supported production research to help apple growers reduce their reliance on high-risk pesticides is UW-Madison professor Dan Mahr's coddling moth research. Coddling moth is the most important apple pest in North America. Infested fruit is unmarketable and unfit for processing. Crop losses can be as high as 50-80% using traditional biological control methods. As a result, apple growers rely on organophosphates for coddling moth control. These high-risk pesticides are likely to be withdrawn or severely restricted from the market in 4-5 years.

The coddling moth is not native to North America and has no natural enemies here. The PURR Project provided Mahr with funding to introduce *Mastrus ridibundus*, a natural enemy of the coddling moth, into Door County orchards. This insect was introduced in 2000, overwintered well, and parasitized 38% of the coddling moth cocoons gathered in the summer of 2001. *Mastrus* will typically parasitize 30-40% of coddling moth larvae, so these results are promising. Mahr seeks additional funds to establish *Mastrus* around the state and track the rate at which this insect spreads in Door County. Other states including Minnesota, Michigan, California and Utah have supported extensive release programs in an effort to safeguard their apple industries.

Research projects

Fungicides comprise about 2/3 of the total volume of pesticides used on Wisconsin apples. Many of the fungicides used in Wisconsin apple production are also classified as high-risk to farmers and farm workers and may be restricted or removed from the market as EPA reviews pesticides for re-registration. With PURR project support, UW researcher Patricia McManus looked at low-risk alternatives for controlling apple fungal diseases such as scab, sooty blotch, and flyspeck. A mixture of methionine and riboflavin was effective at controlling sooty blotch and flyspeck, as was a mixture containing potassium bicarbonate.



PURR-supported research helps Wisconsin growers like Bill Stone of Brightonwoods Orchard, Burlington, to control insect and fungal pests in apples with low-risk strategies. (Photo credit: Sheri Butterfield, UW-Madison)

Research projects

PURR supported outreach work to demonstrate how to reduce herbicide use in field crops.

Field crops

Reaching out to farmers to keep our water clean

In 2001, Wisconsin corn and soybean production was valued at nearly $913 million. However, Department of Agriculture, Trade, and Consumer Protection surveys show that pesticides commonly used in corn are frequently detected in Wisconsin's private wells. PURR Project outreach is getting the word out to farmers about the effectiveness of IPM practices that may reduce pesticide residue in ground and surface water while maintaining profitable production of these important Wisconsin crops.

Chris Boerboom of UW-Madison used PURR Project funds to support 32 growers who are demonstrating reduced risk weed management through a Two-Pass Challenge program that encourages diversified weed management. This outreach work included on-farm demonstrations and data collection that bring growers, crop consultants and UW-Extension agents together. This project created a large and effective learning network.

The two-pass program targets pesticide use reduction or appropriate stewardship in four ways:

- Improves weed contral that reduces unnecessary additional herbicide applications.
- Delays the occurrence of weed resistance, which increases herbicide use after resistance develops.
- Promotes reduced herbicide rate strategies.
- Demonstrates the benefits of mechanical weed control, which might replace an herbicide application.

Processing vegetables

Industry and UW work together to create market-based solutions

Wisconsin is the third largest potato-producing state in the nation, with the 2001 potato crop valued at over $169 million. Wisconsin potato growers depend on high-risk pesticides to control common pests and diseases. Biological pest control measures may reduce yields, however, and lower risk pesticides may cost more than their conventional counterparts. Potato growers can offset these higher costs by building market acceptance for a higher priced, low pesticide potato.

A small group of Wisconsin potato growers using IPM are selling their produce under their own Healthy Grown label at select stores east of the Mississippi. Through the Healthy Grown program, these growers hope to receive a premium to help cover the extra costs of reduced risk pesticides, scouting fields for pests, and record keeping. This project is a partnership of the Wisconsin Potato and Vegetable Growers Association, the UW-Madison, the World Wildlife Fund, and the International Crane Foundation.

The PURR Project has supported production research and outreach that has helped farmers in the Healthy Grown program reduce their reliance on high-risk pesticides to meet label standards. Entomologist Jeff Wyman and plant pathologist Walt Stevenson of UW-Madison conducted on-farm research trials comparing low-risk fungicides and insecticides to more traditional potato pesticides. The low-risk strategies effectively controlled most pests except for the potato leafhopper, and had an added benefit of increased parasitic wasp populations in potato fields. These wasps naturally control leafhoppers. There were no significant differences in disease control between the low-risk and conventional fungicides. The use of one low-risk fungicide, azoxystrobin, resulted in higher yields than its conventional counterparts.

In order to get the word out about IPM and help farmers qualify for the Healthy Grown label, Deana Sexson of UW-Madison's Nutrient and Pest Management Program prepared a set of three "fast facts" cards on potato IPM for growers to use while in the field. The cards explain IPM practices for controlling Colorado potato beetle and late blight, and general weed management. The cards are appropriate for growers from the four Midwestern states that produce 30% of the nation's potatoes – Wisconsin, Michigan, Minnesota, and North Dakota.

Steve and Andy Diercks have joined with other Wisconsin growers using IPM to market "Healthy Grown" potatoes. (Photo credit: Tamas Houlihan, Antigo, WI)

Leveraging new money for IPM education

The PURR Project leveraged Department of Justice funds to raise new money for two additional IPM outreach projects.

The PURR Project secured additional funds from the EPA Pesticide Environmental Stewardship Project to develop a **pest management assessment tool for field corn producers**. This assessment tool shows growers where they stand on an IPM continuum. Ninety growers learned how to use this tool at field crop workshops held in Monroe and Adams counties in the spring of 2002. The Outagamie County vo-tech program adopted this tool for their 2002 winter program, and St. Croix County is using the tool with growers as part of a whole-farm assessment. It is also used in the grain crops short course class on the UW-Madison campus. For a copy of the *Pest Management Assessment for Field Corn* tool, contact Bryan Jensen, UW-Madison IPM coordinator or find it on-line at http://ipcm.wisc.edu/surveys/corn.

Remember the old **Burma Shave signs**? The PURR Project is using a similar strategy to get the word out about IPM. In the fall of 2001, farmers posted messages about their IPM practices along Wisconsin county and township roads. A series of consecutive signs communicate clever ditties that promote IPM to passers-by. This novel campaign informs growers and the public about IPM while promoting the Think IPM website (www.thinkipm.org), a resource for growers on systems solutions to pest management.

As an example, the ThinkIPM sign campaign has promoted managed grazing:
Cows harvest their feed-Fertilize as they mow-Isn't grazing intensively-A smart-Way to go?-www.thinkipm.org

Corn growers have access to a pest management assessment tool thanks to PURR support.

Outreach projects

A Burma-Shave style sign campaign educates the public about IPM and promotes the thinkIPM Web site.

Managed grazing is a livestock feeding and management strategy that can keep pests and diseases at bay with few or no chemicals. Intensively grazing pastures forces cows to eat most of the greenery in a pasture, including some weed species, without overgrazing the most desirable grass and legume species. Diverse pastures not only provide good feed for cows — they prevent soil erosion and can alleviate manure concentration.

The Center for Integrated Agricultural Systems has researched economic, environmental, and social benefits of management-intensive grazing on dairy farms. The PURR project has built on this research by supporting the Center's School for Beginning Dairy Farmers and promoting grazing through the Burma Shave sign campaign.

Through innovative outreach strategies such as the pest management assessment tool for field corn and the Burma Shave sign campaign, the PURR project is successfully promoting the adoption of IPM and, ultimately, a safer food supply.

The future

As Wisconsin urbanizes, consumer interest in farm practices will increase.

The PURR Project Partners agree that as long as the EPA is implementing tougher pesticide regulations, more Wisconsin research and outreach on IPM is necessary. In particular, additional research is needed to further test the effectiveness of promising pesticide alternatives discovered through PURR Project research. A few examples of these alternatives include pheromone-mediated mating disruption of the blackheaded fireworm in cranberries and controlling apple coddling moth with a beneficial insect. Furthermore, research is needed on biological controls for new pests such as the soybean aphid, and we need to learn more about weeds developing resistance to low-risk herbicides.

Additional support for UW-Extension outreach is needed to increase farmers' familiarity with IPM basics and how to apply them on their farm. This is particularly true for field crop producers, who tend to believe that IPM is for high-value specialty crops rather than field crops. IPM assessment tools for soybeans and other field crops, modeled after the *Pest Management Assessment for Field Corn*, would help more field crop producers understand how to put IPM to work in their fields.

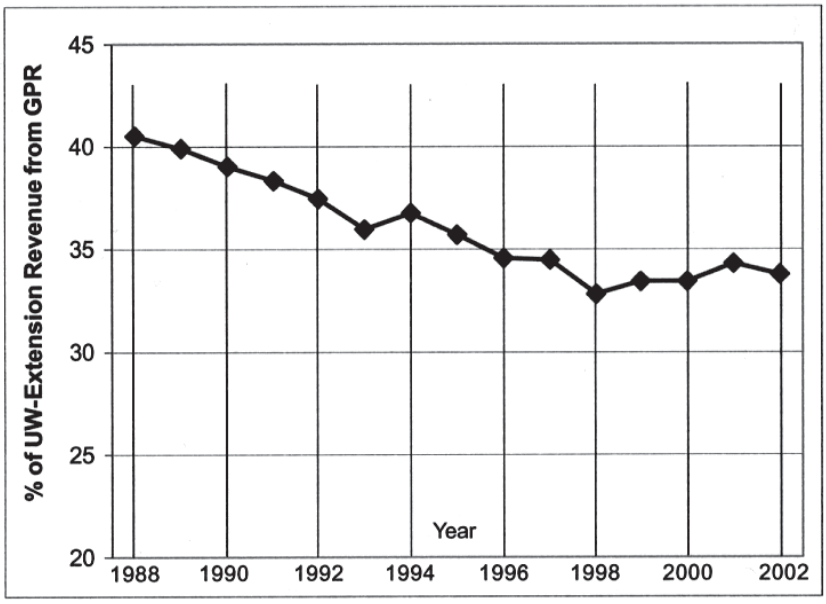


Figure 1. The decline (as a percentage of budget) in UW-Extension funding from General Purpose Revenue, 1988-2002

The general decline in UW-Extension funding has a direct and considerable impact on IPM research and outreach (see Figure 1). Most of the IPM researchers and academic staff on University campuses serve through UW-

The future

Extension appointments. Shrinking (as a percentage of the budget) state support for UW-Extension and UW-Madison over the last 20 years has resulted in fewer UW-Extension staff as some of the vacancies resulting from retirements have not been refilled due to budget constraints. Although Wisconsin farmers increasingly require and request applied research as farming becomes more management intensive, the faculty pool available to respond to farmer needs continues to shrink. State support for production research cannot be replaced with soft money. Indeed, as we have seen with PURR, reliable state support is a sound investment, and is necessary to attract and leverage federal and foundation grants to support vigorous and responsive programs.

Enthusiastic grower response to the Healthy Grown eco-label for potatoes demonstrates the potential for enticing growers to use IPM when tied to value-added marketing of their products. USDA funds leveraged by the PURR Project are being used to develop a label and value-added marketing strategy for apples raised under IPM. Following the potato labeling project model, the apple project brings together researchers and growers to collect baseline information on farmer IPM and pesticide use practices in its first year. In the future, the project will develop a set of production standards that reflect pesticide reduction goals, certify that farms are meeting the standards, and inform consumers that Wisconsin apple growers are meeting and exceeding strict environmental quality standards.

The work was successful—but it has just started.

Partnerships between the University, UW-Extension, State and Federal agencies, and producers are the cornerstone of successful innovations.

The Center for Integrated Agricultural Systems is located on the UW-Madison campus at 1535 Observatory Drive.

The **Center for Integrated Agricultural Systems (CIAS)** is a research center for sustainable agriculture in the College of Agriculture and Life Sciences, University of Wisconsin–Madison. CIAS fosters multidisciplinary inquiry and supports a range of research, curriculum, and program development projects. It brings together university faculty, farmers, policy makers, and others to study relationships between farming practices, farm profitability, the environment and rural vitality. Go to http://www.wisc.edu/cias or call 608.262.5200 for more information.

Administration

CIAS offers help with sustainable agriculture and systems research through mini-grants, proposal writing assistance, publications, and project/process facilitation. Contact **Director Brent McCown, 608-262-5201**, bhmccown@wisc.edu or **Trish Haza, program assistant, 608-262-5200**, phaza@wisc.edu

Communications and outreach

CIAS publicizes and communicates research findings and project outcomes via briefs, reports, web pages, and more. Let us know if you'd like to be on the mailing list or for other information about the communications program. Contact **Cris Carusi, communications manager, 608-262-8018**, cecarusi@wisc.edu, or **Ruth McNair, editor, 608-265-6479**, ramcnair@wisc.edu

Fresh produce production and marketing

CIAS is studying Community Supported Agriculture and other marketing ventures. CIAS publishes information on composting and pest and weed management for market growers. CIAS offers the Wisconsin School for Beginning Market Growers, providing training in market gardening as an integrated system where production, management, and marketing are blended into a comprehensive farm business. Contact **John Hendrickson, outreach specialist, at 608-265-3704**, jhendric@wisc.edu

Pesticide use and risk reduction

CIAS builds linkages between farm organizations, researchers, and others to help farmers find pest management options to high-risk pesticides. Research and outreach about alternatives to high-risk pesticides are a high priority. Contact **Michelle Miller, pesticide use and risk reduction coordinator, 608-262-7135**, mmmille6@wisc.edu

Specialty crops and value added

CIAS explores new markets and products, such as echinacea, small grains and crop rotations, and pastured poultry. Contact **Don Schuster, project economist, 608-262-7879**, schuster@aae.wisc.edu
Also contact **Associate Director Steve Stevenson, 608-262-5202**, gwsteven@wisc.edu for pastured poultry and specialty cheese research.

Sustainable livestock

CIAS offers the Wisconsin School for Beginning Dairy Farmers, providing classroom and field experience, mentoring, and farm internships on grazing dairy farms. CIAS also conducts pasture research. Contact **Dick Cates, School for Beginning Dairy Farmers coordinator, 608-265-6437**, rlcates@wisc.edu

Urban food systems

CIAS received a W. K. Kellogg Foundation grant to develop a community-shared urban garden on Madison's northeast side. Contact **Steve Stevenson** for information.


www.thinkIPM.org