

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security, Food Availability: Crops and Agronomic Plants

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	20%			
133	Pollution Prevention and Mitigation	10%			
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%			
205	Plant Management Systems	10%			
216	Integrated Pest Management Systems	20%			
601	Economics of Agricultural Production and Farm Management	25%			
608	Community Resource Planning and Development	5%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	0.0	0.0
Actual Paid Professional	24.3	0.0	0.0	0.0
Actual Volunteer	344.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1140849	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1140849	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

For 2012, University of Wisconsin-Extension Cooperative Extension reports collaboration among North Central Region colleagues and partners providing timely research-based education and assistance to improve food availability through managing and minimizing losses due to plant pests and diseases by prolonging the valuable pest management tool transgenic Bt corn hybrids, enhancing economic and environmental sustainability of agribusinesses by providing local land rental data and teaching how to make fair cropland rental contracts, and strengthening the agricultural economy through partnerships with agricultural service providers as described in the evaluation section of this report.

Strengthening pest management: Researchers warn that Corn Belt farmers may lose a valuable pest management tool - transgenic Bt corn hybrids that produce insect-killing proteins from the soil bacterium *Bacillus thuringiensis* (Bt). Bt-resistant Western corn rootworms (WCR) have been confirmed in Iowa, are suspected in Illinois, Minnesota and Nebraska, and more rootworm feeding than expected with Bt hybrids appears in parts of Wisconsin. As the threat of insect resistance grows, farmers and their advisors need to plant proper refuges and choose seeds based on actual insect pest conditions on their farm. If use of Bt hybrids can be prolonged, transgenic seeds allow farmers to avoid costly insecticides, producing an environmental benefit. WCR Bt-resistance bioassay data from problem cornfields enabled extension educators and partners to deliver information and IPM recommendations in response to farmer questions about unexpected damage and WCR resistance. Pest Management Update meeting survey respondents (375 respondents, a 72% response rate) reported that the extension information they received affected 8,114,670 acres, which they valued at an average \$28.34 per acre - more than \$114 million of value that extension information provided, improving grower management decisions and consultant recommendations.

Valuing fair cropland contracts: Having a written lease has become an important part of any farm business, and interest is growing among both grain farmers and landowners in flex leases that allow the owner to share higher profits but also to assume some of the crop production risks. Local farmland rent survey results became the most frequently requested information from county extension offices in 2012, as well as a vital teaching aid to help rural non-farm landowners and farmers understand variables that can affect the rental rate for each field. Landlords and tenants trained in 2012 reported they gained both valuable information as well as confidence in selecting and drafting the proper lease contract. Just as important is the value of a well-written lease agreement. Farmers who calculate their cost of production to formulate rental rates help ensure that their farm businesses remain economically sustainable. For example, in Pierce County, 65,000 acres of farmland are rented out to tenants, the impact of the decisions associated with rental rates exceeds \$6.6 million in Pierce County, and \$6.1 million on 83,000 rented acres representing 37% of total farmland in St. Croix County.

2. Brief description of the target audience

Cooperative Extension reached an estimated 54,861 adults and 3,457 youth through direct teaching methods. The audience includes North Central Region colleagues, agency scientists, agricultural professionals and other educational partners, grains, commercial vegetable and fruit crop growers and workers, 4-H youth and trained volunteer leaders, grower associations, food processors and entrepreneurs, food coalitions and cooperatives, seed dealers, agricultural service providers, agronomic retail and wholesale suppliers, farm lenders, rural insurance, local and tribal officials, planning commissions, state and federal rural development and regulatory agencies, and others.

Simply counting educational contacts doesn't capture the extent of a program's reach. For example, the 1,525 agricultural professionals who attended the 2012 Wisconsin Crop Management Conference from Wisconsin, Minnesota, Iowa, Illinois, Indiana and Michigan produce a large multiplier effect as Wisconsin Cooperative Extension research-based recommendations ultimately reach an increasing portion of the Great Lakes Region crop production sector including farmers. Extension Integrated Pest Management and other specialists reinforce this work through regional professional development trainings for Wisconsin's 620 Certified Crop Advisors who earn 40 hours of continuing education units every 2 years to remain certified.

3. How was eXtension used?

Wisconsin Cooperative Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather and Western corn rootworm resistance to Bt corn during 2012. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 11 agricultural research stations.

In 2012, extension field and forage crops entomology specialist Eileen Cullen chaired the North Central Coordinating Committee NCCC-46 - Development, Optimization, and Delivery of Management Strategies for Corn Rootworm and Other Below-ground Insect Pests - a multi-state group of independent university scientists working on aspects of corn rootworm biology and management. The 22 NCCC-46 entomologists working on corn rootworm suggested changes needed to prolong use of transgenic Bt corn in a letter to the Environmental Protection Agency posted March 7, 2012:<http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0922-0013>

North Central Farm Management Extension Committee Ag Lease 101 Team members include Wisconsin extension farm management specialist Arlin Brannstrom and farm law specialist Phil Harris (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin):
<http://ohioagmanager.osu.edu/farm-rents/ag-lease-101-new-website-housing-north-central-lease-bulletins-and-sample-leases>

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	54861	0	3457	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	61	60	121

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Manage and minimize the loss due to plant pests and/or diseases.
2	Enhance the economic and environmental sustainability of agribusiness.
3	Build the capacity of the agriculture service and support industry.
4	Innovations and increased efficiencies in production.

Outcome #1

1. Outcome Measures

Manage and minimize the loss due to plant pests and/or diseases.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	114000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Researchers warn that Corn Belt farmers may lose a valuable pest management tool - transgenic Bt corn hybrids that produce insect-killing proteins from the soil bacterium *Bacillus thuringiensis* (Bt). Widespread planting of Bt corn creates selection pressure for target insects to develop resistance. To minimize Bt resistance, the Environmental Protection Agency (EPA) requires farmers to plant refuges of corn that lack the Bt toxin, where susceptible rootworms can pass on their genes to the population. Yet Bt-resistant Western corn rootworms (WCR) have been confirmed in Iowa, are suspected in Illinois, Minnesota and Nebraska, and more rootworm feeding than expected with Bt hybrids appears in parts of Wisconsin. As the threat of insect resistance grows, farmers and their advisors need to plant proper refuges and choose seeds based on actual insect pest conditions on their farm.

What has been done

In 2012, University of Wisconsin-Extension Cooperative Extension field and forage crops entomology specialist Eileen Cullen led colleagues in 6 neighboring states and the NCCC-46 multi-state committee of 22 independent university scientists researching, documenting and mapping clear information on WCR Bt resistance to increase capacity to respond with IPM recommended practices among extension educators, IPM specialists and center directors, 523 crop consultants, agribusiness professionals and growers, 35 independent seed dealers and growers, and other stakeholders through professional networks, EPA, extension publications and local, state and national news media.

During the 2012 growing season, Cullen coordinated efforts of extension entomology specialists at Land Grant universities throughout the North Central Region to identify Bt corn rootworm-protected cornfields with unexpected rootworm feeding damage. Around 45 WCR populations were collected across 6 states from Bt rootworm-protected cornfields with higher than expected root damage - Illinois, Iowa, Michigan, Minnesota, Nebraska and South Dakota. UW-Madison

extension entomology received at least three field reports, but beetles were not collected due to 2012 drought - soil was baked and corn was chopped for silage. Bioassays take 6 to 9 months and results are expected by fall 2013.

Results

Strengthening pest management: More corn hybrids contain multiple transgenic traits, and refuge requirements are changing for multi-trait corn. If use of Bt hybrids can be prolonged, transgenic seeds allow farmers to avoid buying and applying costly insecticides, producing an environmental benefit. Resistance bioassay data from problem fields (higher than expected damage to Bt rootworm-protected corn) enabled extension educators and partners to deliver information and IPM recommendations in response to farmer questions about unexpected damage and WCR resistance to Bt corn. Pest Management Update meeting survey respondents (375 respondents, a 72% response rate) reported that the extension information they received affected 8,114,670 acres, which they valued at an average \$28.34 per acre - more than \$114 million of value that extension information provided, improving grower management decisions and consultant recommendations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Enhance the economic and environmental sustainability of agribusiness.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Record crop production and high grain prices contributed to a 38% rise in cash rents in Wisconsin and other Corn Belt states. High commodity prices, low interest rates, and high farm incomes also drove farmland prices 25% higher. Renting cropland is an important transaction for both landowners and farmers - providing needed income for rural elderly owners living on fixed incomes, yet a major expense for farmers without any assurance of return on their investment due to variables such as weather, market price and competition for farmland. As a result, landowners and farmers are increasingly asking their county extension offices: "What is cropland renting for in my area?" This sparked a need for local-level survey information on farmland rental rates, leasing options and negotiating skills for writing fair rental contracts.

What has been done

In 2011, Dunn County agriculture agent Katie Wantoch led Western Wisconsin colleagues conducting local farmland rate surveys of 5,000 farmers and non-operating landowners in 10 counties. Results were compiled and summarized with extension farm management specialist Arlin Brannstrom, Center for Dairy Profitability. In 2012, survey results reached more than 300 landowners and renters through Renting Farm Assets Workshops in the Chippewa Valley, and 169 attended 9 workshops in 7 western counties. The Farm and Risk Management Team reached 223 through a statewide Renting Farm Assets webinar, 120 farm lenders and professionals at the Western Wisconsin Ag Lenders Conference, colleagues at the annual Agriculture and Natural Resources Extension Conference, plus insurance company and USDA Farm Service Agency staff. Participants learned about legal issues, landlord-tenant relationships, written contract templates and alternative methods for determining fair rental rates. The Western Wisconsin Farmland Rental Rate Survey Summary is published at: <http://fyi.uwex.edu/farmteam>

Results

Valuing fair cropland contracts: Having a written lease has become an important part of any farm business, and interest is growing among both grain farmers and landowners in flex leases that allow the owner to share higher profits but also to assume some of the crop production risks. Local farmland rent survey results became the most frequently requested information from county extension offices in 2012, as well as a vital teaching aid to help rural non-farm landowners and farmers understand variables that can affect the rental rate for each field. Landlords and tenants trained in 2012 reported they gained both valuable information as well as confidence in selecting and drafting the proper lease contract. Just as important is the value of a well-written lease agreement. Farmers who calculate their cost of production to formulate rental rates help ensure that their farm businesses remain economically sustainable. For example, in Pierce County, 65,000 acres of farmland are rented out to tenants, the impact of the decisions associated with rental rates exceeds \$6.6 million in Pierce County, and \$6.1 million on 83,000 rented acres representing 37% of total farmland in St. Croix County.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Build the capacity of the agriculture service and support industry.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Innovations and increased efficiencies in production.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Database development)

Brief Explanation

Database development: UW-Extension Cooperative Extension is in the midst of replacing the legacy planning and reporting database, which was closed in 2012. For this report: The 2012 direct contacts for adults reported are the 4-year average of past performance of relevant statewide teams in 2008-2011.

The 2012 program participation is in alignment with previous years. The 2012 direct contacts for youth reported are 4-H enrollments in relevant projects reported on the ES-237 form for 2011-2012.

Government regulations: In 2012, extension field and forage crops entomology specialist Eileen Cullen chaired the North Central Coordinating Committee NCCC-46 -Development, Optimization, and Delivery of Management Strategies for Corn Rootworm and Other Below-ground Insect Pests - a multi-state group of independent university scientists working on aspects of corn rootworm biology and management. The 22 NCCC-46 entomologists working on corn rootworm suggested changes needed to prolong use of transgenic Bt corn in a letter to the Environmental Protection Agency posted March 7, 2012: <http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0922-0013>

Natural disasters: Intense heat and severe drought rivaling that of 1988 lingered through most of Wisconsin and the Midwest through 2012, compounded by widespread late frost and even some flooding. University of Wisconsin-Extension Cooperative Extension campus and county faculty and staff responded quickly to immediate issues of the drought such as management alternatives for highly stressed corn, dealing with futures contracts and crop insurance, alternative crops that could be planted if the corn crop were lost, securing hay and other feed from alternative sources, family financial stress and more. Planning for, coordinating and leading a longer-term response effort that focuses on the human/family, production and financial aspects of this challenge is one of Cooperative Extension's primary purposes - to respond proactively now so that as drought impacts unfold, programs and resources are in place to continue responding appropriately.

UW-Extension Cooperative Extension has devoted resources to work collaboratively with partner agencies to address challenges involving production, financial, and humans responding to stressful situations. An extension point person has been designated to work with state specialists, county agriculture and family living educators and partners to coordinate the longer-term response needed. See the report added for 2012 Wisconsin Cooperative Extension Response to the Drought.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Strengthening the agricultural economy through partnerships with agricultural service providers: In partnering with agricultural professionals, University of Wisconsin-Extension Cooperative Extension's unique education network is strengthening Wisconsin's agricultural economy, a new study shows. The statewide extension network - 96 state specialists on University of Wisconsin campuses, 85 agriculture educators in 68 of Wisconsin's 72 counties, public and private educational partners and growers - fosters collaboration, innovation and economic development, and bridges local, state and federal levels to improve farm management and scientific understanding of agriculture.

For the 3-year study, a 12-member evaluation team examined a question raised by funders: "Why do we need a county agricultural agent when we have private sector agricultural consultants?" While agricultural extension has traditionally served farmers, agricultural service providers such as crop consultants, cooperative or private business sales staff, veterinarians, dairy nutritionists, lenders and others are increasingly turning to extension for professional development training and support, and validation of best management advice they share with customers. Partnerships with trained agricultural service providers help Cooperative Extension state specialists and county agricultural agents bolster Wisconsin's \$59.16 billion agriculture industry employing 354,000 people.

The study team reports that nearly all 935 agricultural service providers responding to the evaluation survey agreed that Cooperative Extension has contributed to better farm management practices and better scientific understanding of agriculture. Many credited extension personnel with facilitating networks and collaborations and building bridges among government agencies. Impacts include:

- 95% agreed that Cooperative Extension has contributed to both better farm management practices as well as better scientific understanding of agriculture.
- 85% agreed that Cooperative Extension has helped them improve their services to their customers.
- 79% said extension personnel are important in facilitating networks and collaboration in

Wisconsin's agricultural sector.

- 78% said extension recommendations have improved their own or their clients' profitability.
- Half to three-quarters credited Cooperative Extension information and assistance with being research-based, trustworthy, consumer-friendly, accessible, timely and responsive, and providing an acceptable return for time and money invested.
- 71% said extension plays a key role in bridging government agencies at the local, state and federal levels, strengthening relationships and use of research findings.
- Around two-thirds said their professional networks have expanded and they have seen benefits such as improving their own or their clients' environmental impact.

Key Items of Evaluation

Strengthening the agricultural economy through partnerships with agricultural service providers: Researchers describe these impacts in terms of agricultural innovation, setting extension within a complex innovation system as one of many actors contributing to development, diffusion and use of agricultural information by farmers and other decision makers. In this context, extension is not just a conduit transferring information from scientists to farmers. Rather, extension plays a key role as an innovation intermediary and boundary organization in bridging and facilitating relationships among actors in the innovation system, strengthening these relationships and enhancing capacity to access, adapt and apply new knowledge, tools and technology.

Actors in the agricultural innovation system include agricultural entrepreneurs, farmers, farm organizations, researchers and extension personnel, consultants, policy makers, suppliers, processing industries, retailers, customers, institutions, local, state, tribal and federal agencies. Multiple actors form networks to engage in a process of joint learning and negotiation that shapes agricultural innovation. Here are some ways county agricultural educators carry out their innovation intermediary and boundary organization roles to achieve these impacts:

- Extension county agriculture agents help negotiate the boundary between science and decision makers by facilitating dialogue among farmers, scientists and agricultural service providers, both encouraging research agendas rooted in farmers' needs and interests as well as identifying the right problems to address.
- These local educators translate scientific information into site-specific practical language and guidance they share through electronic and social networks.
- They manage demonstration projects and collaborate with state specialists to integrate farmers into applied research projects conducted on their farms. Based on what they discover, county agents and state specialists then share best practice recommendations with farmers, grower associations, colleagues and other agricultural professionals.

The study involved surveys of agricultural service providers (935 respondents for a 52% response rate), county extension agents (72 respondents for an 85% response rate) and state extension specialists (59 respondents for a 64% response rate) plus 18 key informant interviews. The full evaluation report of results from these four groups is titled Impact of the University of Wisconsin-Extension Cooperative Extension's work and partnerships with Agricultural Service Providers in Wisconsin, from UW-Extension Cooperative Extension and UW-River Falls, April 2012.