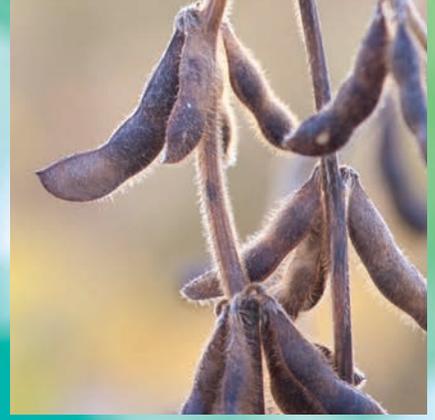


Michigan State University

AgBioResearch

MICHIGAN STATE  
UNIVERSITY

Extension



# LEGISLATIVE REPORT 2012-13

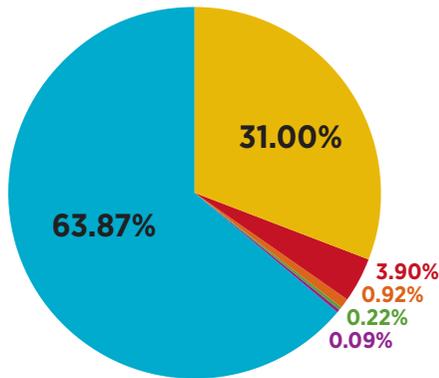


# FUNDING

Michigan State University

## AgBioResearch

### FUNDING FISCAL YEAR 2007-2008



**State Appropriations**  
\$33,996,200 ..... 31.00%  
FY Oct. 2007–Sept. 2008

**Federal Hatch**  
\$4,280,539 ..... 3.90%  
FY Oct. 2007–Sept. 2008

**Federal Hatch Multistate**  
\$1,004,138 ..... 0.92%  
FY Oct. 2007–Sept. 2008

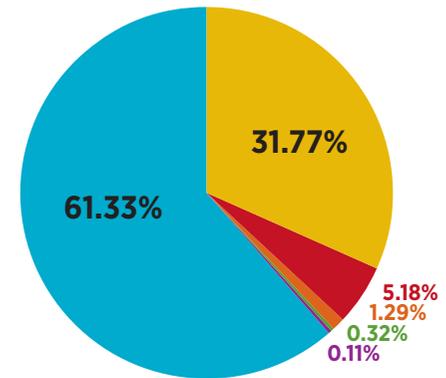
**Federal McIntire-Stennis**  
\$238,224 ..... 0.22%  
FY Oct. 2007–Sept. 2008

**Animal Health**  
\$102,616 ..... 0.09%  
FY Oct. 2007–Sept. 2008

**Grants**  
\$70,046,625 ..... 63.87%  
FY July 2007–June 2008

TOTAL: \$109,668,342

### FUNDING FISCAL YEAR 2012-2013



**State Appropriations**  
\$29,107,871 ..... 31.77%  
FY Oct. 2012–Sept. 2013

**Federal Hatch**  
\$4,748,190 ..... 5.18%  
FY Oct. 2012–Sept. 2013

**Federal Hatch Multistate**  
\$1,181,347 ..... 1.29%  
FY Oct. 2012–Sept. 2013

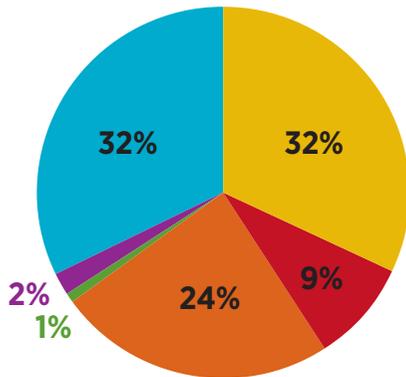
**Federal McIntire-Stennis**  
\$290,078 ..... 0.32%  
FY Oct. 2012–Sept. 2013

**Animal Health**  
\$101,184 ..... 0.11%  
FY Oct. 2012–Sept. 2013

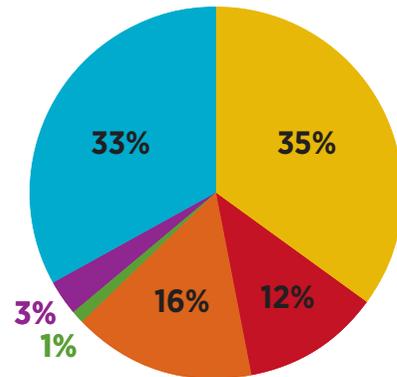
**Grants**  
\$56,195,851 ..... 61.33%  
FY July 2012–June 2013

TOTAL: \$91,624,521

**FUNDING FISCAL YEAR 2007-2008**



**FUNDING FISCAL YEAR 2012-2013**



**State Appropriations**  
\$29,322,300 ..... 32%  
FY Oct. 2007–Sept. 2008

**MSU General Fund**  
\$697,983 ..... 1%  
FY July 2007–June 2008

**Federal Cooperative Extension**  
\$8,170,247 ..... 9%  
FY Oct. 2007–Sept. 2008

**Federal Special Projects**  
\$1,977,723 ..... 2%  
FY Oct. 2007–Sept. 2008

**County Investments**  
\$21,676,665 ..... 24%  
FY Varies

**Grants**  
\$28,545,391 ..... 32%  
FY July 2007–June 2008

**TOTAL: \$90,390,309**

**State Appropriations**  
\$25,096,729 ..... 35%  
FY Oct. 2012–Sept. 2013

**MSU General Fund**  
\$994,012 ..... 1%  
FY July 2012–June 2013

**Federal Cooperative Extension**  
\$8,353,274 ..... 12%  
FY Oct. 2012–Sept. 2013

**Federal Special Projects**  
\$1,785,433 ..... 3%  
FY Oct. 2012–Sept. 2013

**County Investments**  
\$11,548,421 ..... 16%  
FY Varies

**Grants**  
\$23,018,681 ..... 33%  
FY July 2012–June 2013

**TOTAL: \$70,796,550**

# MEASURING OUR IMPACT

## LEVERAGING STATE FUNDING

Every dollar that the state invests in AgBioResearch and MSU Extension generates additional funding from the federal budget and from external contracts, grants and other revenue sources to serve Michigan residents. In fiscal year 2013, the state invested \$54,204,600 in MSU Extension and AgBioResearch, and the organizations were able to leverage those funds into an additional \$108,574,150. In the past three years, MSU Extension and AgBioResearch have been able to leverage every dollar invested into \$2.19 in additional funding and have generated \$818,624,224 for Michigan residents. Overall, the total impact of state investment in AgBioResearch and MSU Extension was \$15 to every \$1 invested.\*

\*Economic analysis by Steven R. Miller, Center for Economic Analysis, MSU Department of Agricultural, Food and Resource Economics



## FUELING THE ECONOMY

Michigan's food and agriculture businesses generate more than \$91.4 billion of economic activity annually. MSU Extension and MSU AgBioResearch continue to fuel that growth by collaborating with food- and agriculture-related businesses to ensure they have a well-trained work force and access to services. These services help them identify markets, innovate new products and make critical decisions from product concept to launch.

The MSU Product Center Food-Ag-Bio is emblematic of the way Extension and AgBioResearch work one-on-one with entrepreneurs to supply objective, evidence-based methods for starting and growing their businesses. The center was established in 2003 with funds from Extension and AgBioResearch.

In 2012-13, the MSU Product Center advised 482 clients, resulting in:

- » 73 venture launches.
- » More than \$3 million in total capital formation, including \$2.5 million of owner investment in Michigan businesses.
- » 258 new jobs created or retained.



# CONNECTING WITH RESIDENTS

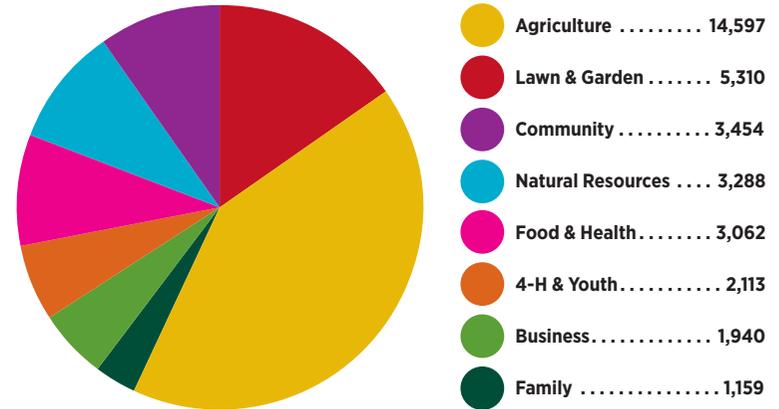
MSU Extension personnel actively collect data to track the organization's progress toward programming goals. Our educators and specialists reach people through face-to-face trainings, online webinars, social media, website interaction and electronic newsletters. Aggregating that data for the first time reveals some encouraging results and sets a baseline for growth going forward.

Combining all forms of reach, MSU Extension made more than 2.8 million connections with Michigan residents in fiscal year 2013.

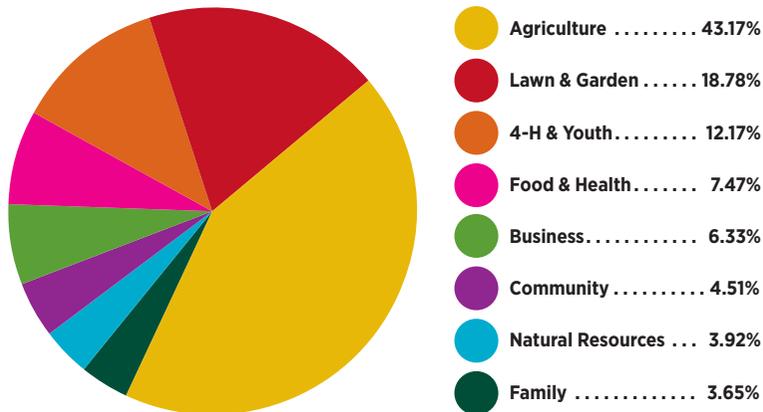
- » More than 141,000 adults and nearly 175,000 youth participated in MSU Extension programming.
- » In April 2012, MSU Extension launched a more robust *msue.msu.edu* site featuring regularly updated educational content written by each of the organization's educators. From July 1, 2012, to June 30, 2013, more than 716,000 visitors viewed 2.1 million pages. Of those, nearly 70 percent were first-time visitors. Search engine rankings make the MSU Extension site one of the most visited Cooperative Extension System education sites in the country.

- » MSU Extension communicators created a series of electronic newsletters that Michigan residents have eagerly signed up to receive. Each month, MSU Extension distributes nearly 35,000 topic-specific newsletters to more than 6,500 email addresses.

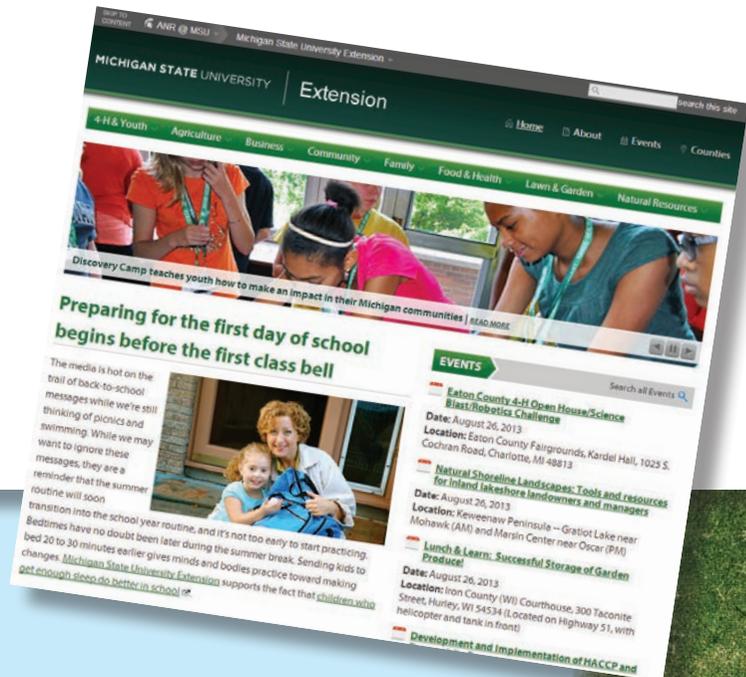
MSU Extension newsletters readership by topic



msue.msu.edu visits by topic area\*



\*The chart shows topic areas viewed, not specific articles.



# AGRICULTURE & FOOD CONFIDENCE INDEX

## MSU PRODUCT CENTER STUDY: LEADERS BULLISH ON FOOD AND AGRICULTURE

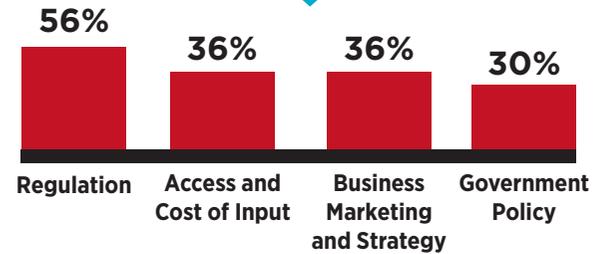
According to the first Michigan Agriculture and Food Index (MAFI), leaders in agriculture are bullish on the state's current business climate for agriculture and food.

Members of the Food and Agriculture Roundtable give their current business condition a rating of 147. (A rating of 100 is considered neutral.) Michigan's overall economic outlook yielded a rating of 115 - positive but considerably less strong. Staff members at the MSU Product Center Food-Ag-Bio sent the questionnaires that obtained these results to the roundtable, which consists of more than 100 movers and shakers representing Michigan agriculture and food processing.

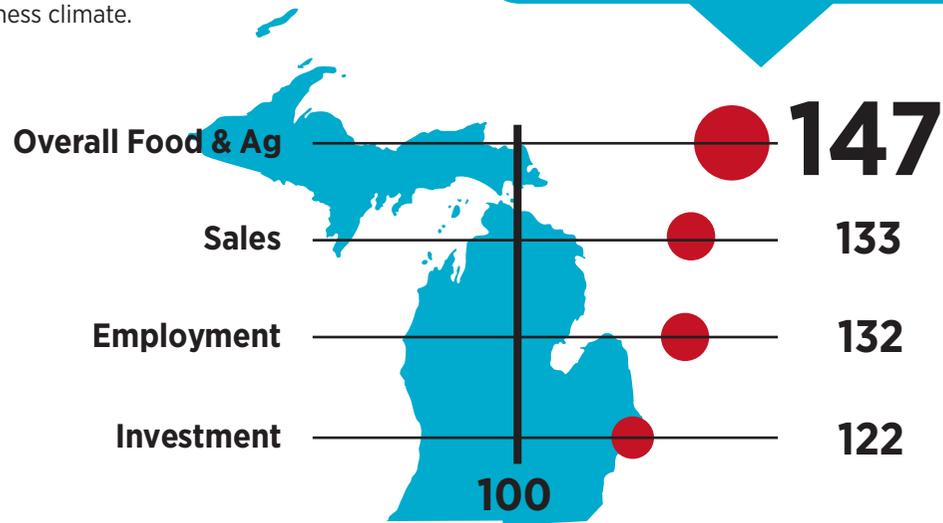
MSU administrators will use survey results and interactions with roundtable members to set strategic direction and ensure their priorities are on track with industry needs.

The survey will be repeated every six months to track agriculture leaders' changing perceptions of the business climate.

*What keeps farmers, agribusiness firms and food processors up at night?*



*Index for the current and future state of the Food and Agriculture system in Michigan*



A rating of 100 is considered neutral; ratings above 100 signal increasingly positive confidence and below 100, increasingly negative confidence.

## FAMILIES GAIN NUTRITION AND FARM KNOWLEDGE AT BREAKFAST ON THE FARM

Since 2009, Breakfast on the Farm (BOTF) has bridged the farm-to-fork gap between more than 46,000 people and the farmers who produce their food. BOTF gives non-farm families and community members an opportunity to tour local farms and learn about modern food production. Throughout the state, thousands of consumers have taken the opportunity to spend time learning about where their food comes from.



MSU Extension conducted five BOTF educational programs in 2013. Twenty-six programs have taken place since BOTF started in 2009.

Results of an evaluation of approximately 675 respondents who attended a BOTF found:

- » 90 percent reported their confidence in Michigan dairy products increased.
- » 85 percent reported that their trust in milk as a safe food increased.
- » 90 percent stated they would talk to others about what they learned at BOTF.

At the completion of the farm visit, there was a:

- » 20 percent increase in trust that farmers will do the right thing in caring for the environment.
- » 20 percent increase in trust that farmers will do the right thing in treatment of food-producing animals.
- » 17 percent increase in trust that farmers will do the right thing to safeguard milk.

*“It’s really about taking care of the land. We’re excited to show our non-farm neighbors what we’re all about and how we produce the food they eat.”*

– Erin Humm, host of Gratiot County BOTF, August 17, 2013

## FOOD SAFETY INCREASES IN PORK PRODUCTION AND TRANSPORT

Pork producers need relevant, unbiased, research-based information about all aspects of pork production to enhance the production of safe, nutritious, high-quality pork products in an environmentally and economically sustainable and socially responsible manner.

MSU Extension educators taught food safety programs supported by the National Pork Board to Michigan pork producers and pork transporters representing 80 percent of the pigs marketed in Michigan.

- » The Pork Quality Assurance (PQA) and Transport Quality Assurance (TQA) programs reached pork producers who market \$91 million in pork products.
- » Producers and employees who received PQA certification represented 595,144 pigs marketed in 2012.
- » During 2012, the average price for pigs marketed was \$150 per head, and the average live weight was 276 pounds per pig — equating to \$89 million in gross sales.
- » The drivers and handlers trained in the TQA program add another \$1.8 million value of protected pork products to the consumer.

# PRODUCTION AGRICULTURE

## CULTIVATING PEST MANAGEMENT PRACTICES TO HELP ORGANIC AND CONVENTIONAL GROWERS

Consumer demand for organically produced goods has shown double-digit growth for well over a decade. These products are now available in nearly 75 percent of conventional grocery stores, and they often have substantial price premiums to growers over conventional products, according to U. S. Department of Agriculture Economic Research Service data.

Field crops, such as corn, soybeans and dry beans, are Michigan's largest organically grown crops. The state also produces smaller acreages of certified organic blueberries, tree fruit crops and vegetables.

MSU AgBioResearch entomologist Matthew Grieshop is monitoring the organic growth trend. His research focuses on organic pest management practices to benefit not only organic growers but conventional ones as well.

Some of the current projects of the Extension specialist include:

- » Growing food with less energy expenditures and fewer negative impacts on the surrounding environment
- » Examining ways to best manage the orchard floor by using repetitive cultivation to control weeds, which also serves as a catch for carbon and other nutrients
- » Helping growers develop biological control resources on the farm, especially for farms growing diversified crops

Most of Grieshop's organic research can be applied to conventional orchards and crops as well. Traditional types of growers are beginning to phase-in some of the organic practices into their pest and disease management plans.

*"I don't have all the answers, but I can help growers find answers and share ideas. One of the best parts of my job is the collaboration with growers."*  
 – Matthew Grieshop

## UNDERSTANDING THE IMPORTANCE OF MILK COMPONENTS TO FARM PROFITABILITY

More than one-third of Midwest dairy farmers experience low milk-fat production in their cows at any given moment. This occurrence, known as milk fat depression, is particularly challenging because it diminishes returns for the farmer.

MSU AgBioResearch animal scientist Adam Lock is investigating dietary risk factors associated with milk fat depression and identifying ways to increase milk fat yield.

The MSU Extension specialist is looking at:

- » The digestive processes occurring in the rumen — the first of four parts of a cow's stomach.
- » Corn silage samples to better understand potential differences in the amounts and types of fatty acids in the major component of a dairy cow's diet.

Lock and fellow MSU AgBioResearch animal scientist Mike Allen are researching how different pH and starch levels and the types of fatty acids present in the rumen affect milk fat production. They are also investigating whether milk fat and milk yield can be increased by supplementing the diet with specific fatty acids.

The dairy industry plays an important economic role in Michigan. In 2010, dairy generated \$1.4 billion in cash receipts. It was the largest commodity group contribution within the state, outpacing the next closest — corn — by more than \$300 million.

*"It's inefficient if there's a dietary issue that's making a dairy cow produce 3 percent milk fat instead of 4 percent. Those inefficiencies get passed down the line as higher prices in the grocery store."*  
 – Adam Lock

## TRAINING FUTURE AGRICULTURE PROFESSIONALS THROUGH EXTENSION

A new internship program through MSU Extension aimed at training the next generation of agriculture and agribusiness professionals helped interns gain hands-on career experience. Seven students with a passion for agriculture were selected to work with several MSU Extension educators throughout Michigan.

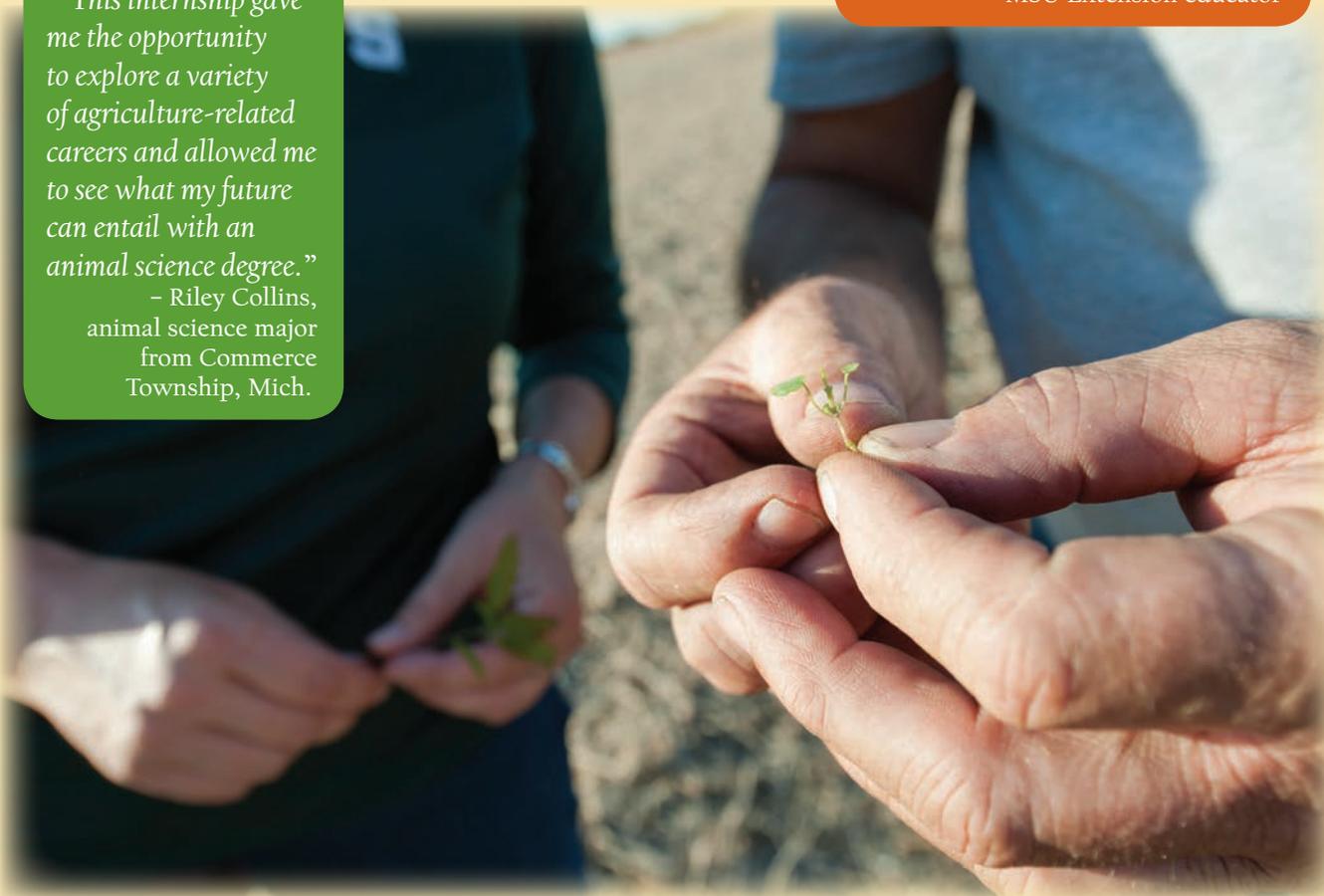
Interns worked with educators on daily educational programming, applied research, demonstration trials, data collection and record keeping, offering the students a chance to explore a variety of agriculture-related fields.

*“This internship gave me the opportunity to explore a variety of agriculture-related careers and allowed me to see what my future can entail with an animal science degree.”*

*– Riley Collins,  
animal science major  
from Commerce  
Township, Mich.*

*“It is exciting to work with interns who are excited about the future of agriculture, learn about their perspectives in regard to agriculture and teach about the many aspects of what agriculture has to offer.”*

*– Tom Guthrie,  
MSU Extension educator*



## HELPING MICHIGAN GROWERS TACKLE DOWNY MILDEW

Over the past decade, downy mildew — the No. 1 disease threatening vegetable production worldwide — has proven to be a troubling foe of Michigan cucurbit growers. Another kind of downy mildew that preys specifically on impatiens has been equally challenging for Michigan floriculturists to overcome.

MSU AgBioResearch plant pathologist Mary Hausbeck and molecular biologist Brad Day are collaborating to equip growers with solutions to outsmart these destructive pathogens.

Hausbeck, who is also an MSU Extension specialist, works to:

- » Monitor the real-time occurrence of the pathogens in the field.
- » Communicate important findings with growers and industry leaders through outreach.
- » Develop and refine growers' management practices to keep agriculture profitable.
- » Monitor the pathogens' virulence through spore traps and fungicide trials.

Day, whose projects focus on understanding cucurbit downy mildew, works to:

- » Understand how the pathogen evolves.
- » Identify cucurbit genes that contribute to disease resistance.
- » Develop advanced diagnostic tools to measure the pathogen's virulence.

Using Project GREEN (Generating Research and Extension to meet Economic and Environmental Needs) funds, Hausbeck and other MSU researchers have created an intricate, statewide spore trap network and monitoring system that enables them to keep growers informed. The system helps growers save money and to conserve fungicide applications for when they're most needed.

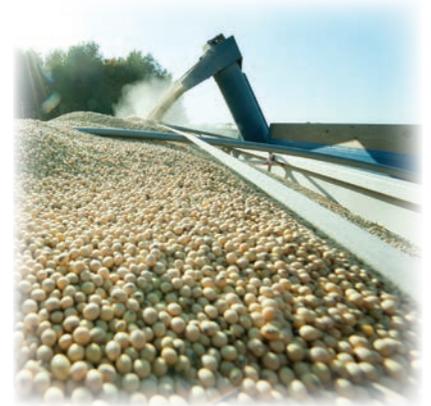
*“A big thrust in my lab is to identify issues that limit production for Michigan vegetable and greenhouse growers, and then to solve those problems with new research. We start with the growers and their needs, then we get their feedback and work with the industries to make sure we are addressing their priorities.”*

– Mary Hausbeck

## THWARTING THREATS TO MICHIGAN SOYBEANS, DRY BEANS

Soybean sudden death syndrome (SDS), a two-phase fungal disease that causes premature defoliation and root rot, has destroyed thousands of acres of Michigan soybeans.

Since the disease's recent emergence in Michigan, MSU AgBioResearch plant pathologist Martin Chilvers has worked to monitor the progression of soybean SDS outbreaks in the state.



Working in partnership with Michigan industry leaders, Extension specialists and other scientists in the Midwest, Chilvers' efforts to thwart this disease include:

- » Identifying the range of diversity of the SDS pathogen in the U.S.
- » Helping breeders identify genes for resistance
- » Developing a real-time diagnostic tool to help growers confirm the presence of SDS in fields
- » Exploring if and how soybean SDS acts as a vector for other soybean-preying diseases and pests

He is also identifying which species of Pythium — a parasitic oomycete related to Phytophthora — are affecting soybeans and other crops used in field rotations.

Chilvers is equally concerned about the potential impact soybean SDS might have on another Michigan crop: dry beans. In collaboration with MSU AgBioResearch dry bean breeder Jim Kelly, Chilvers has been monitoring the foliar and root symptoms of several dry bean varieties in field and greenhouse trials. Pending the results, Chilvers will develop management strategies for future disease threats.

*“Most of the dry bean-producing areas are in the Thumb region. With time, we will see more virulent soybean sudden death syndrome in that area – how will that affect dry beans?”*

– Martin Chilvers

## REDUCING MASTITIS AND ANTIBIOTIC USE IN DAIRY CATTLE

Mastitis, an infection of a cow's udder, is the most common infectious disease in dairy cattle in North America. The average cost is \$300 to \$600 per occurrence because the infection reduces milk production and decreases the well-being of the animal.

MSU AgBioResearch veterinarian and Extension specialist Ron Erskine and a collaborative research team have received a \$3 million grant from the U.S. Department of Agriculture National Institute of Food and Agriculture to reduce mastitis and antimicrobial use in dairy cattle.

The five-year grant continues a U.S. and Canadian cooperative project that reduced the incidence of mastitis. In Michigan, the project has been aided by:

- » The strong alliances between producers, dairy cooperatives, MSU Extension, the MSU College of Veterinary Medicine and regulatory professionals.
- » The fact that Michigan is one of the top states in mastitis control and production of quality milk.

Factors that reduce the occurrence of mastitis include:

- » Modern, well-ventilated barns that keep cows clean, dry and comfortable
- » Training sessions for dairy workers that lead to a better understanding of milking procedures

The researchers plan to develop a quality milk audit tool and a specialist certification program, and then evaluate the impact of these on the reduction of mastitis.

*“We need to re-double efforts on employee training and education on dairy farms and emphasize staying with protocols. It’s human nature for people to go through training and then drift away from the protocol. We are really going to seek ways in the dairy farm community to encourage workers to keep to the proper procedures.”*

– Ron Erskine



## SIMPLIFYING FOOD SYSTEMS WITHOUT COMPROMISING VALUE

National consumer trends suggest 60 percent of consumers consciously try to buy locally produced food.\* Trends also show a growing demand for more local, grass-fed meat production — a type of food system not currently well-established in Michigan.\*\*

MSU AgBioResearch animal scientist Jason Rowntree is helping Michigan’s beef industry meet this demand by developing feasible value-added, grass-fed beef chains in the Upper Great Lakes region.

Using a USDA North Central Region Sustainable Agriculture Research and Education (NCR-SARE) grant, Rowntree is:

- » Developing models for streamlined local and regional food distribution systems.
- » Exploring ways to become less dependent on petroleum and oil in food systems.
- » Linking local producers with local consumers, thus lowering input costs.

His research, which relies on the partnership of 20 beef farms in the Traverse City area to develop viable, cost-efficient grass finishing systems, will help pave the way from the pasture to the plate. This project also calls for partnership with local butchers, chefs and consumers.

Some of Rowntree’s other areas of beef research include:

- » Battling bovine tuberculosis
- » Improving soil quality through new grazing efforts
- » Developing holistic approaches to beef cattle and whitetail deer management
- » Exploring selective forage plot establishment, hay feeding and fencing strategies

\*MSU Center for Regional Food Systems

\*\*USDA Economic Research Service

*“We make it a goal to be regenerative, versus extractive, in our farming practices, working to develop streamlined local and regional food distribution systems that simplify the global food delivery system.”*

– Jason Rowntree

*“If we have pretty plants, that’s a good start, but we’ve got to create the combination of plants and point-of-purchase information, and that goes beyond price. Point-of-purchase information and the plant material and the price — that’s the most compelling package.”*

– Bridget Behe

## GAINING INSIGHT INTO CONSUMER BEHAVIORS TOWARD HORTICULTURAL PURCHASES

Consumer behavior has always been important for retailers, but with increased climate change and changing weather patterns, this information has also become critical to horticulturists. With a struggling economy and growing public concern over water usage, horticulturists have experienced sporadic sales declines that are often drought related.

MSU AgBioResearch horticulturist Bridget Behe is working to help reverse those sales drops by closely observing consumer behaviors and determining what types of information eventually lead to a purchase.



The Extension specialist, along with her research team, are:

- » Using eye-tracking technology to determine how consumers look at a product and, ultimately, how they make purchasing decisions.
- » Studying the differences in how consumers in different regions of the world perceive low-water-use plants.

Her findings indicate a relationship between the amount of information provided with the plant and whether a purchase is made. The odds of purchasing increase when the price, plant material and other information about the plant are packaged together.

Comparing consumer behaviors in Australia and the United States, Behe found that concern over water usage is higher among consumers in drought-sensitive areas. These consumers give more consideration to water usage when making purchases.

Further research will include investigating the influence of QR (quick response) codes and other smartphone applications consumers use while shopping.

## OVERCOMING HERBICIDE-RESISTANT WEEDS

Each year, Michigan growers invest thousands of dollars into weed control hoping to eliminate the invasive plants without compromising crop success. Herbicide-resistant weeds, such as Palmer amaranth, are especially challenging and costly to control.

MSU AgBioResearch weed scientist Christy Sprague works with growers to overcome the issues of herbicide-resistant weeds by developing effective, cost-efficient management strategies.

The MSU Extension specialist focuses her research and outreach on:

- » Communicating important findings with growers and industry leaders.
- » Raising awareness among growers, urging them to take quick, precise measures.
- » Engaging in applied research to combat three major glyphosate-resistant weeds in Michigan.
- » Diversifying weed management strategies for Roundup-ready corn, soybean and sugar beet crops.
- » Understanding how non-native, herbicide-resistant weeds behave in the state's climate.
- » Exploring effective means of depleting weed seed banks.

Sprague also collaborates with industry leaders and other MSU scientists to explore the effects of weeds on conventional and organic cropping systems; desiccation treatments on black bean color retention; and volunteer corn on sugar beet crops, among other projects.

Funding from Michigan Sugar and Project GREEN (Generating Research and Extension to meet Economic and Environmental Needs) has also enabled her to address several key questions from sugar beet growers.

*“The key is to look at questions growers have, find answers and then communicate the findings. The outreach component goes hand in hand with the research component – it’s extremely important that they do.”*

– Christy Sprague



# ENVIRONMENTAL QUALITY & NATURAL RESOURCES MANAGEMENT

## PROTECTING WATER RESOURCES STATEWIDE

Nutrient pollution — the presence of excess nitrogen and phosphorus in the environment — is one of the country's most widespread and costly environmental issues.\* In Michigan, effectively preventing movement of phosphorus into streams and water is of critical concern as it ensures that lakes remain healthy, safe and suitable for recreational use.

MSU AgBioResearch biosystems and agricultural engineer Steven Safferman is testing a cost-efficient material that removes phosphorus from water at on-site wastewater treatment facilities.

MetaMateria Technologies, a developer and manufacturer of water purification solutions, is relying on Safferman's independent testing to assess the effectiveness of the pioneering material.

The product is expected to:

- » Reduce the environmental impact of phosphorus.
- » Change how water is treated in wastewater treatment facilities.
- » Make for a more cost-effective treatment process.

Because phosphorus is a finite mineral, Safferman also hopes to identify a means of recovering the phosphorus that is removed for use in other applications. Currently, most phosphorus utilized in the United States is mined from other countries — a costly practice. If successful in garnering phosphorus from the material, Safferman will explore how to remove it from animal manure — another abundant source of phosphorus.

\*U.S. Environmental Protection Agency

*“This project is a great example of industry-university partnership.”*  
— Steven Safferman

## RESTORING STURGEON IN THE GREAT LAKES

The lake sturgeon is the largest Great Lakes fish species, measuring 6 to 8 feet and weighing more than 130 pounds. It also lives the longest, surviving for up to 100 years. Now, at less than 1 percent of its historical abundance, the fish is considered a threatened species in Michigan.

MSU AgBioResearch evolutionary ecologist Kim Scribner is conducting a long-term research project to investigate management practices and environmental factors that affect lake sturgeon.

Working closely with the fisheries division of the Michigan Department of Natural Resources (DNR)\* at Black Lake — located in Cheboygan and Presque Isle counties — Scribner has been able to:

- » Tag roughly 1,200 adult lake sturgeon (200 to 250 each year).
- » Sample lake sturgeon eggs, fry and juveniles.
- » Characterize aspects of the species' ecology.
- » Dissect the species' complicated life history.

Because bacteria appear to be a major cause of mortality at the egg stage, Scribner also works with MSU microbiologist Terence Marsh to learn more about microbial communities in order to predict the conditions driving egg mortality.

Used by fisheries personnel, Scribner's data also acts as the basis of a website he hopes Michigan science, technology, engineering and mathematics (STEM) K-12 teachers will use for classroom instruction.

\*Scribner's work is funded in part by the DNR fisheries division through the Partnership for Ecosystem Research and Management agreement.

## MICHIGAN FAMILIES SAVE MORE THAN 10,000 FOREST ACRES

Michigan boasts more than 20 million acres of forestland with more than 40 percent owned by 440,000 families and individuals. These forests are sizable natural and financial assets when considering the value of the land, timber and other features. Challenges exist, however, including:

- » 39 percent of forest owners are 69 years old or older.
- » 44 percent said that their heirs are too dispersed.
- » 38 percent indicated that one or more heirs are disinterested.
- » 35 percent have difficulty finding qualified advisors.



The MSU Extension Ties to the Land program helps families negotiate the financial and legal issues of planning a transfer of these forestlands from one generation to the next. Participants in a follow-up survey representing 11,828 forest acres, included the following results:

- » 72 percent discussed goals for their property within the last year; an additional 22 percent intend to do so within the next six to 12 months.
- » 44 percent have taken steps to increase family involvement in property; 17 percent intend to do so within the next six to 12 months.
- » 39 percent explored legal structure for estate planning; 28 percent intend to do so within the next six to 12 months.

*"I hope we are inspiring the next generation to have a greater appreciation of fish and natural resources, using sturgeon as an ambassador."*

– Kim Scribner



## ADDRESSING CLIMATE CHANGE, PREVENTING ENVIRONMENTAL HARM

Average summer temperatures in the Midwest are projected to increase steadily, making Michigan summers feel more like those in present-day Oklahoma by the end of this century.\*

MSU AgBioResearch scientist Jiaguo Qi is studying how climate change and agricultural shifts toward planting more bioenergy crops affect agricultural production.

Through his research, Qi has been able to identify an unintended result of increased bioenergy crop production: greater greenhouse gas emissions and more nitrogen leaching.

Using satellite images to determine the location and rate of biofuel crop expansions, Qi monitors the effects these expansions have on climate change. He uses the information to create models that predict crop yield and provide insight into how weather might affect crop systems during growing seasons.

Qi also works to identify early warning signs of extreme weather to help growers prepare and avoid major crop loss. Other emphases are:

- » Developing production alternatives to lessen the environmental damage that contributes to global warming trends
- » Identifying climate warming trends and climate patterns shifts
- » Helping growers manage land and mitigate potential losses

Believing that steps can be taken to respond to climate changes, Qi hopes to offer viable response options to extreme weather events that do not have negative environmental impacts.

\*U.S. Global Change Research Program

*“Last year (2012) in Michigan was an example of altered or changed climate, and it significantly affected the crops.”*

*– Jiaguo Qi*

## EXPLORING WHAT GREAT LAKES HAVE TO OFFER

Michigan Sea Grant Extension programs help people understand the impact they have on the Great Lakes as well as the impact the Great Lakes have on their lives. The programs advance sustainable economic growth, and the social and environmental health of Michigan's natural resources.

The Michigan Catch & Cook tourism initiative encourages marketing of sport fishing and dining on the Great Lakes through a partnership between charter boat operators and restaurants. From May 2012 to the end of the year:

- » The program registered 47 charter boats and 29 restaurants representing 21 ports in 17 coastal counties.
- » The Catch & Cook website that promotes the program logged more than 10,000 visits.

The Great Lakes Education Program (GLEP) introduces students to the Great Lakes with an approved science curriculum that educates fourth-graders through an integration of geography, history, biology and the physical sciences.

- » In the spring and fall of 2012, 150 teachers and 4,270 students took part in the program on Lake St. Clair and the Detroit River.
- » Since the program's inception in 1991, GLEP has introduced more than 92,000 K-12 students, teachers and adult chaperones to this unique, hands-on, science-based learning experience.

## CREATING ENVIRONMENTAL STEWARDS THROUGH AWARD-WINNING 4-H CAMP

For 30 years, Michigan teens have been attending 4-H Great Lakes and Natural Resources



Camp in Presque Isle. The location boasts an assortment of natural resources, unique coastal wetlands, dunes, state parks and a national marine sanctuary. The MSU Extension program increases campers' interest in science, readiness for college, awareness of potential careers and environmental stewardship. Research-based content covered during the week-long camp includes environmental and place-based education, experiential learning and youth development.

In 2008, the annual camp was named a 4-H Program of Distinction, and in 2011, it was selected out of 70 nominations as one of eight top science programs in a National 4-H Science program in-depth case study. MSU Extension 4-H Youth Development partners with the Michigan 4-H Foundation, Michigan Sea Grant Extension, the MSU Department of Fisheries and Wildlife, the Great Lakes Fishery Commission and the U.S. Fish and Wildlife Service to offer the camp.

Camp participants left camp with many improved life skills as a result of attending camp:

- » 97 percent said they had developed leadership skills.
- » 97 percent said they had developed communication skills.
- » 92.5 percent said they had developed problem-solving skills.

# FOOD SAFETY & SECURITY

## PROTECTING SOIL, WATER AND FOOD RESOURCES IN MICHIGAN

Research from the past several decades indicates that human wastewater treatment practices and the use of manure in agriculture may be threatening two of Michigan's most important resources: water and soil.

Applying biosolids to fields as a means of fertilizing crops is a common practice. When derived from animal manure or human wastewater treatment sludge, biosolids can contain low levels of pharmaceuticals, antibiotics and hormones that can move through the soil to the surrounding environment via surface and groundwater.

MSU AgBioResearch chemist Hui Li is protecting the food supply by exploring how these pharmaceuticals behave in soil and water.

The consequences of human exposure to low levels of undefined mixtures of bioactive chemicals are currently unknown, but are of important significance. Li's goal is to close this gap in understanding and to gain insight about the impact of these pharmaceuticals on human and ecosystem health.

The implications of Li's research include:

- » Understanding plant uptake of pharmaceuticals in crop systems
- » Preserving the purity and safety of drinking water
- » Decreasing human exposure to undefined mixtures of bioactive chemicals
- » Shaping U.S. Environmental Protection Agency regulations
- » Improving agriculture and waste management best practices

All of these will work together to ensure the integrity of Michigan food systems — starting from the ground up.

*“These insights will play a key role in the development of standards and regulations, enabling decision makers to take the best approach to soil and water management.”*

– Hui Li

*“No violations from inspection. Very useful course. I'd like to send my entire staff.”*

– ServSafe participant

## KEEPING FOOD SAFE: KEEPING YOU SAFE

Demand for wholesome, locally grown food is rising. Food preservation is a cost-effective way to have nutritious, locally grown food year-round. Increased demand combined with enhanced state food laws make food safety education crucial. MSU Extension food safety education programs help prevent foodborne illness and ensure a safer food supply for consumers.

MSU Extension offers ServSafe, a national certification program for those working in food service, specifically managers and other leaders.

A post-survey of 35 ServSafe participants taken three months after class ended indicated:

- » 27 percent had an increased profit.
- » 54 percent noticed increased employee morale.

The MSU Extension 2012 Food Safety report reflected that of 461 food preservation workshop attendees, 94 percent will select high-quality foods to preserve.

Beginning October 1, 2012, changes took effect in both the Michigan Cottage Food Law and the Michigan Food Code. A post-survey of Cottage Food Law workshop participants taken three months after class ended reflected that 86 percent started a Cottage Food Law business in 2012. Participants reported updating food labels and being careful to wash hands and keep countertops clean when preparing foods.

## SHEDDING NEW LIGHT ON BACTERIAL INFECTIONS

Foodborne infections are a major public health concern in the United States, causing 48 million illnesses and 3,036 deaths each year.\* Shiga toxin-producing *Escherichia coli* (STEC) is especially virulent, affecting millions around the globe.



MSU AgBioResearch microbiologist and epidemiologist Shannon Manning is making life-saving discoveries about the bacteria as she explores a viable means to control it.

Manning collaborates with the Michigan Department of Community Health to explore the human clinical disease aspects of STEC. Together, they have been able to:

- » Recover a STEC O104:H4 isolate that caused the deadly 2011 *E. coli* outbreak in Germany.
- » Identify what made the strain in Germany so powerful (its ability to form a biofilm during infection).
- » Create in-lab, mutant strains of STEC that may produce less toxin.

A second project focuses on screening cattle, the primary reservoir for STEC, to:

- » Identify strains similar to those in human infections.
- » Determine cattle characteristics important for the disease process.

Manning's ultimate goal is to pinpoint factors that can be modified to decrease *E. coli* shedding in cattle, especially those that involve farm management practices such as changing feed, bedding types or both, as well as improving sanitation conditions.

\*Centers for Disease Control and Prevention

*“The highest number of deaths we have ever seen for an *E. coli* outbreak occurred in Germany and was caused by this strain of *E. coli* O104:H4. There were 54 deaths and more than 3,800 people infected.”*

– Shannon Manning

*“Our long-term goal is to develop new interventions and treatments for foodborne and waterborne diseases; we want to know what makes people more susceptible or more resistant to enteric diseases.”*

– Linda Mansfield

## PROVIDING NEW PREVENTIVE AND THERAPEUTIC TARGETS FOR FOODBORNE DISEASES

At any given time, trillions of tiny microbes — some helpful, some harmful — are living on and in humans, forming communities and outnumbering the body's own cells tenfold.

A group of researchers led by MSU AgBioResearch microbiologist Linda Mansfield is using a \$7.3 million federal grant to establish the MSU Enterics Research Investigational Network, Cooperative Research Center to study the microbes that live in human intestines, analyzing the role they play in foodborne and waterborne illnesses that kill thousands worldwide each year.

The research:

- » Includes multidisciplinary endeavors and highly integrates the role of the enteric microbiome in health and disease.
- » Explores the relationship of the enteric microbiome to acute diarrheal illness, one of the most prevalent and important global health problems.
- » Focuses on illnesses caused by *E. coli*, *Salmonella*, *Clostridium difficile* and *Campylobacter jejuni*, among others.
- » Examines three specific areas: microbial ecology and pathogenesis, led by MSU microbiologist Robert Britton; host response, led by Mansfield; and clinical research, led by AgBioResearch molecular epidemiologist Shannon Manning, with collaborations between these groups speeding the progress.

Early evidence suggests the enteric microbiome profoundly affects health and disease susceptibility and could likely be a new preventive and therapeutic target.

# ENERGY PRODUCTION & CONSERVATION

## KEEPING IT GREEN: RECYCLING WASTE TO RESOURCES

MSU and MSU Extension hosted “Keeping it Green: Recycling Waste to Resources” in August 2013 to highlight sustainable campus-based projects focused on reducing and reusing organic waste and converting it into energy.

During the event, the South Campus Anaerobic Digester system was unveiled showcasing how the project impacts campus energy and sustainability by taking organic waste and turning it into power. The organic matter used to feed the system includes campus waste, such as food waste from dining halls and cow manure from the MSU Dairy Teaching and Research Center, as well as grease from local restaurants and fruit and vegetable waste from the Meijer Distribution Center in Lansing.

The South Campus Anaerobic Digester system:

- » Will use 17,000 tons of waste from university farms and dining halls.
- » Will generate 2.8 million kilowatt hours of electricity per year to power several buildings on South Campus.
- » Is the largest anaerobic digester on a college campus in the United States.
- » Diverts 10,000 tons per year of landfill and wastewater.

*“We know that the world is a diverse place. We cannot expect the same results if you grow the same crops in different locations. What we have put together is a whole series of sites that can capture the variability in soils and climates. The end goal is to use that information to better understand how much we can grow, where we should grow it and where we should not grow it.”*

– David Rothstein

## MONITORING THE EFFECTS OF BIOMASS PRODUCTION ON CLIMATE

The Energy Independence and Security Act of 2007 mandates increased use of clean renewable fuels made from grassy and woody plants, food crop residues and other sources.

MSU AgBioResearch forester David Rothstein is studying how the conversion of marginal or abandoned agricultural lands to the production of woody biofuel crops in the northern parts of Michigan, Wisconsin and Minnesota can contribute to the reduction in greenhouse gas emissions from the burning of fossil fuels. His work with experimental willow and poplar plantations is being done in collaboration with researchers at the University of Wisconsin and the University of Minnesota along with the Great Lakes Bioenergy Research Center and the MSU Forest Biomass Innovation Center (FBIC) in Escanaba, one of 13 MSU AgBioResearch facilities in Michigan.

Rothstein’s work aims to:

- » Quantify the soil impacts, greenhouse gas (GHG) emissions and biomass production associated with short-rotation woody cropping systems.
- » Provide information to use in predictive models to assess the true environmental impacts and benefits of expanded bioenergy plantations.

Taking marginal or abandoned agricultural lands for energy crops would minimize competition for land used for food production and would not involve harvesting wood for energy from existing forests.

## MICHIGAN TEENS CONTINUE TO PAVE THE WAY FOR BIOENERGY

For three summers, youth aged 13 to 19 have spent five days exploring different opportunities in the field of energy. Touring facilities and participating in hands-on activities on and off Michigan State University's campus, 4-H Discovery Camp participants worked with leading researchers who are developing the latest innovations in biofuel production and technology that offer alternatives to fossil-based fuels.

4-H Discovery Camp is the only camp in the country designed to educate youth on current issues and technologies impacting energy and the environment. Results of a participant survey included:

- » 93 percent are more knowledgeable about bioenergy as well as careers related to bioenergy.
- » 92 percent are now more likely to pursue a degree or career in a bioenergy-related field.
- » 80 percent anticipate a change in personal energy use.
- » 64 percent plan to teach what they have learned to others.

*"If we start using the new things that some people are already focused on, I am going to be able to say I'm part of it."*

- 14-year-old 4-H Discovery Camp participant Nael Hallak

## ADVANCING BIOFUELS AND CHEMICALS FROM RENEWABLE FEEDSTOCKS

Ethanol, derived in large part in the United States from corn, is an alcohol used almost exclusively as a biofuel additive for gasoline. In 2011, worldwide ethanol fuel production reached more than 22 billion gallons. The U.S. led the way with 62 percent of the total.

MSU AgBioResearch chemical engineer Dennis Miller is exploring the possibility of using ethanol and related alcohol forms in an effort to help bolster biofuel production and ultimately identify ways to use different forms of alcohol as feedstocks to produce even higher value products.

Some of Miller's work in this area includes:

- » Using ethanol to make butanol, a gasoline additive that commands a higher price than ethanol
- » Developing catalyst materials that trigger the alcohol formation under specific conditions
- » Combining acids and alcohols to make esters, which are used as fuels and solvents, as well as to make plastics

His lab also explores practical and economical solutions, examining less-processed biomass feedstocks that are available at lower costs than in the past. He started his research on renewable feedstocks in the late 1980s and has been inspired over the years by collaborations taking place at MSU and specifically at the Michigan Biotechnology Institute.

*"We're in the very early stages of seeing a significant fraction of our consumer goods made from renewables. We are still very much petroleum based. Our job at the university is to develop these types of technologies and abilities, and when the time is right and they become economically feasible, they'll be ready and people will take them."*

- Dennis Miller



## YOUTH PROGRAMS BACK STATE EDUCATION EFFORTS

Across the state, students' academic performance is assessed according to the Michigan Grade Level Content Expectations (GLCE). MSU Extension 4-H programs expose youth to GLCE standards in unique ways. Michigan 4-H pre-college programs get youth excited about a variety of academic topics.

Programs such as 4-H Great Lakes and Natural Resources Camp, 4-H Discovery Camp, 4-H Capitol Experience and 4-H Exploration Days expose youth to science curriculum standards, energy production practices, governmental procedures and public policy as well as hands-on learning sessions and recreation opportunities. Participants have said that as a result of their participation in 4-H programs, they feel better prepared to attend college.

According to a Tufts University Study of Positive Youth Development, youth involved with 4-H Youth Development programs:

- » Are 40 percent more likely to pursue a career in science.
- » Are at least 1.5 times more likely to have high academic competence.
- » Are 1.7 times more likely to be highly engaged in school.

The Tufts study also finds that girls in 4-H are more than twice as likely to participate in science, engineering or computer technology programs than their peers.



*“The wars in Iraq and Afghanistan are winding down, but the issues that these veterans have faced will not go away. We know from Vietnam era veterans that the issues will be around for the next 10 to 20 years or more.”*

– Adrian Blow

## HELPING MILITARY FAMILIES COPE WITH THE STRESS OF DEPLOYMENT

More than 19,000 service members from the Michigan National Guard have served in Iraq and Afghanistan as part of the U.S. military presence there. War is stressful and challenging; soldiers are exposed to potentially traumatic experiences, and families have to adapt to the deployment of loved ones.

MSU AgBioResearch marriage and family therapist Adrian Blow is helping National Guard members and their families cope with the stress of deployment because they have unique circumstances that distinguish them from their active-duty counterparts.

With research based on helping families and improving health, Blow is using \$1.5 million in grants to:

- » Make presentations at reintegration events that take place after a unit returns home.
- » Conduct a three-year study funded by the U.S. Department of Defense on family resiliency through the deployment cycle.
- » Train 1,000 mental health providers to work with service members, using evidence-based practices that fit the military profile.

Ultimately, he plans to relay the key findings to local and national policymakers. He'll look into the impact of deployment on families and find out what they might need to do better. The information will also be used to help improve future reintegration efforts by the military.

## EMPOWERING PEOPLE TO CONTROL FINANCES

MSU Extension served as a key partner with the Federal Bank of Chicago's nationwide celebration of Money Smart Week. Educators with expertise in credit, debt and housing issues held 11 "Be a Money SMARTY!" (BAMS) events and Finances in Focus resource fairs throughout southeastern Michigan and Grand Rapids from April 20 to 27. Attendees received a series of easy-to-follow tips, enjoyed a Q&A session and even had the chance to talk one-on-one with a financial counselor about money issues.

As part of Money Smart Week:

- » The GM Tech Center in Warren held an exclusive BAMS program for its employees.
- » A five-hour live Ask an Expert call-in program took place in coordination with Fox 2 News Detroit.
- » The Ask an Expert program had 36 minutes of dedicated broadcast time reaching 301,500 households.
- » The program "Top Ten Tips for Credit and Debt" was broadcast on Detroit Public Television, and DVDs have been produced and made available to public and commercial television outlets across the United States.

As a result:

- » 98.93 percent of survey respondents found the BAMS presentation "valuable" or "very valuable."
- » 2,635 residents were reached via a combination of events, simulcast viewers, online chat participants and Q&A callers.

## IMPROVING SCHOOL READINESS AT AN EARLY AGE

MSU Extension works to improve school readiness and early childhood literacy skills. Studies show that compared to their peers, children who have adults read to them develop a larger vocabulary, become better readers and perform better in school.

MSU Extension is putting books in the hands of thousands of children. Through a partnership with the Molina Foundation, MSU Extension has donated an estimated quarter-million books to children aged zero to 8 who are living in low-income situations. In addition to donations made from the Molina Foundation, MSU Extension 4-H has:

- » Trained more than 3,400 parents and other care-giving adults to help nearly 10,000 children gain literacy skills that will last a lifetime.
- » Provided more than 10,000 children with books through summer programs that promote out-of-school learning.
- » Had 100 percent of program participants say they will read to their children more often.
- » Helped almost 100 percent of participants gain new knowledge.



*"As a librarian, this workshop has provided me with statistics to back up the work we already do and the information to pass on to parents."*

- Early childhood literacy program participant

## HELPING COMMUNITIES STAY VIOLENCE FREE

Violence permeates American life. Sometimes — such as in mass shootings — media coverage assures awareness. However, sometimes violence occurs in families, where it may go unnoticed. Violence affects people in all stages of life, from infants to elderly people.

MSU AgBioResearch public health scientist April Zeoli wants to help communities stay safe and violence free. One project studies women going through child custody cases with former partners who were and may still be abusive.

Preliminary findings indicate:

- » 91 percent of the women were abused during child custody exchanges.
- » In 76 percent of cases, fathers made threats against mothers.
- » In 50 percent of the cases, fathers made threats against the children or the mother's family.
- » In 29 percent of the cases, the fathers made death threats.

As data is gathered, researchers will determine if protective orders or supervised exchanges increase women's safety.

Zeoli also recently led a team of MSU researchers in tracking homicides in Newark, N.J. Homicide clusters first appeared in the economically depressed center of Newark and moved into western and southern Newark, areas with high poverty rates. Homicide stayed out of northern and eastern parts of the city, possibly because they are the most economically vibrant.

## CONNECTING HIGHER EDUCATION WITH BETTER CAREER OPTIONS

By 2020, 65 percent of Michigan jobs will require a career certificate or college degree. However, nearly 14,000 members of Michigan's class of 2012 dropped out of high school, costing the state nearly \$14 billion in estimated lifetime income.

Involvement in 4-H improves participation in higher education which, in turn, improves career prospects for 4-H participants, especially in high-demand careers such as science, technology, engineering and math (STEM). The President's Council of Advisors on Science and Technology estimates that American businesses need one million STEM graduates in the next decade to remain competitive internationally. According to the Tufts University 4-H Study of Positive Youth Development, 4-H'ers are 40 percent more likely to pursue a career in science than their peers. Of the 886 4-H alumni who entered Michigan State University between 2010 and 2012, 40 percent enrolled in a STEM major.

- » Michigan 4-H'ers who graduated high school between 2009 and 2011 are attending college at a 77 percent higher rate than their Michigan peers.
- » Michigan 4-H received a \$20,000 grant from National 4-H Council to create a career exploration curriculum for high school youth, which is being released in 2013.
- » A Delta County program connecting 4-H youth with local business owners inspired youth, with 79 percent saying they would like to start their own businesses.



*“I see so many opportunities for my future. It really prepared me for college.”*

– 4-H Exploration Days youth participant from Lapeer County

*“As a parent, I can rest assured that my children will attend college and set goals for themselves – largely due to their experiences at 4-H Exploration Days!”*

– 4-H parent from Alger County

## STUDIES SHOW 4-H'ERS DO BETTER IN SCHOOL

In Michigan, only 37 percent of adults aged 25 or more have an associate degree or higher. However, according to a Tufts University 4-H Study of Positive Youth Development, 4-H'ers are nearly twice as likely to plan to go to college compared to youth involved in other out-of-school-time activities.

4-H members make a difference in their communities and the MSU Extension 4-H Youth Development program makes a difference in members' lives.

The Tufts study shows that compared to youth involved in other out-of-school-time activities, 4-H youth are:

- » 50 percent more likely to report high academic competence.
- » 60 percent less likely to engage in risky, problem behaviors.
- » Three times more likely to contribute to their communities.
- » 70 percent more likely to be emotionally and behaviorally engaged with school.
- » 60 percent more likely to participate in science, engineering and technology programs.

## CRUNCHING THE NUMBERS TO HELP MICHIGAN CITIES

Many Michigan cities have faced a multitude of financial problems, especially over the last five years.

MSU AgBioResearch economist Mark Skidmore has found diverse ways to help Michigan cities with those fiscal challenges. One example is the creation of a standardized database that is available online and updated yearly. Access to this program has enabled ordinary citizens and fiscal planners alike to look at how their communities are faring financially and compare them to others.

The Betty and David Morris Chair in State and Local Government Finance and Policy and MSU Extension specialist also:

- » Collaborated with Eric Scorsone, an MSU Extension specialist and economist, to identify factors that have led to the revenue decline and increased costs for many communities.
- » Worked with Gary Sands, an associate professor in the Department of Geography and Urban Planning at Wayne State University, at the invitation of a Detroit council member to provide options for property tax reform in Detroit. (One plan was to impose a broad-based tax on land.)

Skidmore said he also believes that a statewide elimination of the taxable value cap would help the Michigan tax base more accurately reflect market value.

*“In the case of Detroit, many properties have gone into tax foreclosure. The city has taken ownership of those properties and has not moved them back into the private sector, so a huge chunk of the city is city-owned property.”*

– Mark Skidmore

## SAVING MICHIGAN HOMES AND MONEY

MSU Extension’s financial literacy and housing education programs help families and individuals at any stage of their lives make smart money decisions and work through the homeownership process. These courses help reduce mortgage defaults by enabling the counseling of new homebuyers as well as of homeowners that are already experiencing foreclosure. Of the 116 foreclosure cases that Extension staff members counseled from October 2012 to June 2013, 58 retained homeownership.

Financially healthy individuals and families create an environment for sustained community prosperity. Surveys of past participants have indicated that individuals and families leave the classes knowing how to make smart money decisions. Many are taking steps to improve their financial health, which helps to ensure a stable economy and decrease the number of foreclosure cases in Michigan. Of those past participants:

- » 92 percent have reported writing out a spending plan.
- » 92 percent are taking steps to improve their credit report and score.
- » 87 percent are saving money to prepare for homeownership.

# COMMUNITY & ECONOMIC DEVELOPMENT

## EDUCATING THE PUBLIC AND OFFICIALS ON DETROIT BANKRUPTCY

One of the biggest developments of the year has been the navigation of Detroit's fiscal issues by Detroit and Michigan officials, the appointment of an emergency manager and the city's declaration of bankruptcy. Every step along the way, MSU Extension educators and specialists have offered evidence-based, non-biased expertise in municipal finance and have helped the public understand the often complicated issues involved.

Eric Scorsone, an MSU professor of economics and MSU Extension specialist, has been Extension's point person. Scorsone and others in Extension have developed materials on common questions regarding the Emergency Manager Law and municipal bankruptcy



issues. They've spoken at government hearings and worked individually with government officials to navigate the complicated legal issues involved in declaring a financial emergency and the legal options available to an emergency manager.

Scorsone has been sought out by more than 100 media outlets on five continents regarding the Detroit bankruptcy.

*"Basically the Mick Jagger of muni finance."*

- Zoe Clark, Michigan Radio  
"It's Just Politics," referring to  
MSU Extension specialist  
Eric Scorsone



## ASSESSING MUNICIPAL LEGACY COSTS

Many cities throughout Michigan are facing severe fiscal stress. One of the biggest drivers of that stress is unfunded health care benefits offered to retirees. To help communities face these challenges, MSU Extension economists generated the state's first comprehensive report on unfunded municipal legacy costs, also known as other post-employment benefits (OPEB).

Among the key findings in the report, titled *Funding the Legacy: The Cost of Municipal Workers' Retirement Benefits to Michigan Communities*:

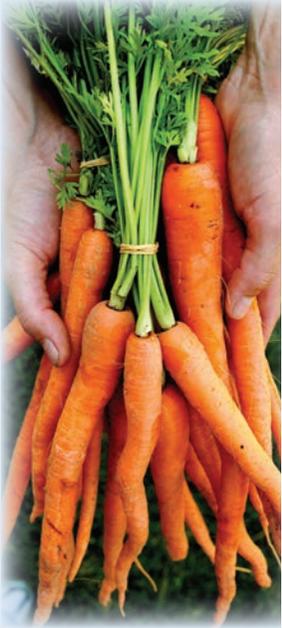
- » Michigan municipalities face an unfunded retiree health care liability of \$12.7 billion over the next 30 years.
- » Almost \$11 billion of that total is attributable to a 10-county region of southeastern Michigan that includes Oakland, Macomb and Wayne counties.
- » Detroit alone will owe \$5 billion in retiree health care costs.
- » A levy to fund this burden would consist of 15 to 20 mills or about double the levies typically generated to fund municipal services.
- » MSU Extension analyzed all 1,773 cities, townships and villages in Michigan and found 311 that offered OPEB.
- » A publically available appendix with the data used to generate the report's findings has more than 15,000 data points on the 311 Michigan municipalities that offer OPEB.

## BOOSTING MICHIGAN CHRISTMAS TREE SALEABILITY WITH IPM

Michigan Christmas tree growers working with MSU Extension's Integrated Pest Management (IPM) reported they were able to harvest trees that would have been unsaleable due to pest damage resulting in a \$1,021,200 gain to their businesses.

Insects and diseases cause significant damage to Christmas tree foliage, decreasing saleability of the trees. Through IPM, MSU Extension educators taught Christmas tree producers how to reduce inputs of pesticides and improve timing of necessary sprays.

MSU Extension helped growers form management plans to control many types of insects and disease such as the Douglas-fir needle midge, hemlock scale, pine needle scale and pine tortoise scale. Educators also helped growers scout their fields to determine when insects were active, look at spray coverage and evaluate the effectiveness of their spray programs.



## CONNECTING RESIDENTS WITH LOCAL, HEALTHY FOOD

MSU Extension is firmly committed to the growing field of community food systems — establishing regional food hubs through education and partnerships that increase access to healthy food that is sustainable, fair and affordable.

A thriving community food system starts with just that — a community. MSU Extension is dedicated to going where the community is. In its effort to increase outreach and education, MSU Extension has signed agreements with two of the biggest downtown markets in Michigan — Eastern Market in Detroit and the Grand Rapids Downtown Market.

MSU Extension has dedicated office space at both markets that offers a direct connection between the thousands of market shoppers and Extension educators in fields ranging from growing food, eating healthy, starting a food business and more.

- » 40,000 people attend Eastern Market each week.
- » 6,000 people attend the farmers market at the Grand Rapids Downtown Market each week.
- » In 2012, MSU Extension developed 29 Michigan Fresh pamphlets.
- » In 2012, MSU Extension distributed 1,700 food preservation recipe books and 2,000 food preservation samples.
- » From April 19, 2012, to Aug. 1, 2013, the MSU Extension website received 8,704 page views to Michigan Fresh pages.

## CREATING MORE GREEN SPACE IN FLINT

Today, the city of Flint is a symbol of deindustrialization, urban decay and violence. But this is a place where people live, where residents still hope for better times.

In an effort to contribute to ongoing initiatives by Flint residents, MSU AgBioResearch sociologist Stephen Gasteyer has been involved in a three-year intervention in two Flint neighborhoods to improve the physical surroundings.

The project involved:

- » Clearing overgrown common areas and adjacent vacant lots in two Flint neighborhoods to determine the social impacts of community-based land use transformation
- » Determining if the development of a more vibrant social ecology mitigates the effects of structural decline

MSU turfgrass expert Thomas A. Nikolai spearheaded the project with funding from The Scott's Company and the Michigan Turfgrass Foundation. The John Deere Company donated 10 mowers.

Now that common areas have been cleared, people are coming together. Membership in a neighborhood watch program has increased. Successful community gatherings have taken place in the new common areas. Gasteyer wants to deepen the relationship with the communities by helping residents and officials think about what to do next and how people outside the community can assist.



*“We should think about the assets that MSU – and other universities and organizations – bring to the table and how to better connect all of these initiatives. Where there is a connection, there may be ways to leverage opportunities and create synergies that better help Flint.”*

– Stephen Gasteyer

## EXPLORING THE LINK BETWEEN OBESITY AND AIR POLLUTION

More than one in three adults has cardiometabolic syndrome (CMS), a cluster of metabolic abnormalities such as high cholesterol, obesity, high blood pressure and high blood sugar that increases the risk of cardiovascular disease and diabetes.

MSU AgBioResearch pathobiologist Jack Harkema is investigating the link between CMS and air pollution, believing that air pollution enhances facets of CMS.

Past research demonstrates that smoking combined with predisposing conditions contributes to CMS onset, causing changes in the body apart from the lungs. Harkema believes that exposure to air pollution can do the same, affecting multiple organ systems including the heart, lungs and liver as well as affecting the level of body fat.

Harkema has found that mice fed a high-fructose diet show CMS symptoms after a few weeks; when exposed to air pollutants, the rodents develop a condition known as insulin resistance, believed to be the underlying physiological cause of CMS.

Because so many Americans consume high-fructose products, Harkema's work as the director of the Great Lakes Air Center for Integrated Environmental Research (GLACIER) involves:

- » Examining whether the consumption of high-fructose products contributes to CMS.
- » Investigating whether a high-sugar or high-fat diet increases the risk of cardiopulmonary alterations from breathing polluted air.

*“The intersection of two major health problems, obesity and air pollution, is being investigated by many scientists. We’re on the forefront and have a great opportunity working with some of the world’s best environmental scientists to tackle this global problem.”*

– Jack Harkema

*“(I learned) explanations and relationship to real-world situations that help you understand that controlling anger is possible.”*

– RELAX participant

## EMPOWERING SELF AND PEER RELATIONSHIPS THROUGH RELAX

MSU Extension estimates that 75 to 90 percent of illnesses are stress related. Chronic stress is a major issue for many Americans and has been proven to lead to a variety of health problems. Stress affects us on a cognitive and emotional level. It can affect the part of the brain that has to do with decision-making, keeping us stuck in unhealthy behaviors. Those experiencing chronic stress are more likely to eat high-fat and sugary foods, increasing the risk for becoming overweight and developing obesity or diabetes. Stress can cause the following long-term health problems:

- » High blood pressure
- » Muscle or joint pain
- » Shortness of breath
- » Diseases such as fibromyalgia
- » Digestive problems
- » Heart disease
- » Altered blood glucose levels

RELAX: Alternatives to Anger, a four-part education series, is designed to help adults, parents, teens and caregivers increase their knowledge about stress and anger issues. Participants put healthy relationship skills into practice by better managing emotions.

## PREVENTING BULLYING BEFORE IT STARTS

Bullying is a public health problem that results in serious, lasting issues. According to the Centers for Disease Control and Prevention, bullying puts youth at higher risk for the following:

- » Physical injury
- » Social and emotional distress
- » Substance abuse
- » Academic problems
- » Mental health issues
- » Violence in adolescence and adulthood
- » Death



In a University of Michigan study of 821 children between ages 8 and 11, 25 percent admitted to being bullied.

Be SAFE (Safe, Affirming and Fair Environments), an MSU Extension bullying prevention and education program, is designed to help adults and youth ages 11 to 14 work together to create physically and emotionally safe environments.

“As a result of your program, our adults are more open to understanding young people, and the youth seem to better recognize how much concern and care the adults have for their safety,” said a youth group leader who uses Be SAFE.

“I have treated my friends better and respected them more,” said a youth participant in an MSU Extension social and emotional health program.

“I learned how to be there more for friends and be more understanding,” said a youth participant in an MSU Extension social and emotional health program.

Be SAFE aims to not only put an end to bullying but also prevent it from happening.

*“Our studies show a very high percentage of preschoolers who are overweight – higher than the Centers for Disease Control rates. We’re getting close to 40 percent overweight and obese children ages 3 to 5 in the immediate four-county region (Ingham, Clinton, Livingston and Shiawassee).”*

– Sharon Hoerr

## HELPING CHILDREN EAT HEALTHIER DIETS

Childhood obesity rates in the United States have more than tripled in the past three decades. In 2008, more than one-third of children and adolescents were overweight or obese.\*

MSU AgBioResearch food scientist and human nutritionist Sharon Hoerr is developing resources to help parents raise healthy eaters, thus fighting obesity and encouraging better performance in school.

In partnership with two child development specialists, several pediatric dietitians and a senior producer from the MSU College of Communication Arts and Sciences, Hoerr has created 24 short video segments to accompany a five-topic set of booklets called “Eat Healthy: Your Kids Are Watching! A Parent’s Guide to Raising a Healthy Eater.”

Hoerr explains that children negatively perceive overt control (“Eat this, don’t eat that;” “Eat this if you want ice cream”). She has found that parents who successfully encourage healthy eating in their children are those who:

- » Employ covert, authoritative control when guiding children’s diets.
- » Encourage children, rather than punish them, for their food choices.
- » Adopt positive eating habits themselves.



In collaboration with the Michigan Nutrition Network at the Michigan Fitness Foundation (MFF), Hoerr plans to determine how effective her guide is in a quasi-experimental design over an eight-month period.

\*Centers for Disease Control and Prevention



## MAKING MICHIGAN ACTIVE AND HEALTHY

The Centers for Disease Control and Prevention reports that more than 30 percent of Michigan adults are considered obese. MSU Extension offers multiple programs that focus on lifestyle changes to incorporate physical activity and healthy eating.

Supplemental Nutrition Assistance Program-Education (SNAP-Ed) reached 95,302 people during 2012, and 94 percent of program participants reported being more willing to try new items or increase consumption of items in a particular food group.

Funded through SNAP-Ed, the 2012 Eating Right Is Basic (ERIB) program reached almost 7,000 adults in 72 Michigan counties, and 36 percent who completed ERIB increased time spent doing physical activity.

The Eat Smart Live Strong program educates seniors on the importance of consuming fruits and vegetables, and incorporating physical activity into daily routines. Of people who participated in Eat Smart Live Strong from March 1 to June 30, 2012:

- » 95 percent said they learned ways to eat more fruits and vegetables within a limited budget.
- » 85 percent said they learned solutions to overcome challenges that prevent them from engaging in 30 minutes of physical activity most days.

Show Me Nutrition reached 52,395 children in 82 counties. Teachers reported:

- » 93 percent of children were willing to try new foods.
- » 88 percent of children reflected they were more aware of healthy nutrition.

## LEARNING TO MANAGE DIABETES

According to the Centers for Disease Control and Prevention, about 35 percent of adults have prediabetes — many do not know it. In Michigan during 2012, more than 9 percent of adults were diagnosed with diabetes — an estimated 701,000 people. In addition, 364,400 Michigan adults are estimated to have undiagnosed diabetes.

Dining with Diabetes is a five-session course designed for people at risk of diabetes or who have diabetes, as well as their family members.

MSU Extension coaches Dining with Diabetes participants to adopt lifestyle changes to prevent the onset of prediabetes and teaches them to manage their existing conditions. Dining with Diabetes participants learn:

- » The causes of diabetes.
- » Tools for managing diabetes.
- » The importance of diet and exercise in managing diabetes.
- » Portion control.
- » Management of A1C blood glucose level.

In addition, participants learn how to prepare healthy meals using less fat, sodium and sugar without reducing flavor. They also learn how to read nutrition labels.

Dining with Diabetes has proven to be an effective program for Michigan residents.

*“Since December, I lost 20 pounds and my A1C dropped from 8.9 to under 7. I feel much better and my doctor is ecstatic.”*

– Dining with Diabetes participant



Douglas D. Buhler  
Director, MSU AgBioResearch

As the Michigan economy continues to grow, Michigan State University continues to ensure that the people of Michigan have the tools they need to benefit from this growth. MSU Extension provides residents with access to science-based research conducted by MSU AgBioResearch – research that makes a difference in the health of our citizens, in our agriculture-, food- and natural resource-based economies, and in the strength of our communities.

During the 2012-13 fiscal year, MSU AgBioResearch supported a wide diversity of research, from developing sustainable agriculture production techniques to ensuring a safe and nutritious food supply to discovering innovative ways to tap into alternative energy resources. Our world-class research has shed light on foodborne and waterborne illnesses that cause thousands of deaths each year, ensured healthy lakes by uncovering effective ways to remove phosphorus from the wastewater and assisted cities such as Flint and Detroit facing staggering financial insecurity. These findings help to improve the food we eat, the air we breathe, the land we live on, the health of our children and the resiliency of our communities.

In turn, MSU Extension educators and specialists use that research when designing unbiased, science-based curricula and trainings. In 2012-13, our educators and specialists reached 141,000 adults and nearly 175,000 youth. Combine that with more than 716,00 visitors viewing 2.1 million webpages and nearly 6,500 subscribers to our online educational newsletters, and you can quickly see our expansive and trusted educational reach. Through this report, you will learn how we work hard to ensure that those touch points make a positive difference in the lives of Michigan residents.

Despite budget constraints that leave us with fewer resources than we had five years ago, our staff members continue to excel. We share your commitment to making Michigan a better place to live and raise a family, and to conduct business.

Douglas D. Buhler  
Director, MSU AgBioResearch

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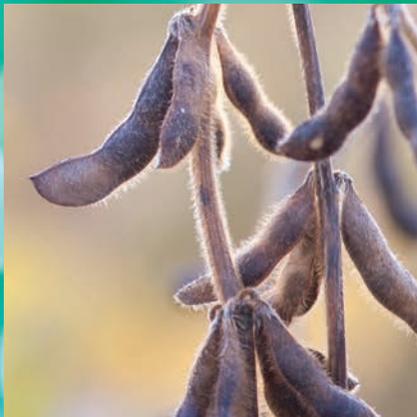
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## FOR MORE INFORMATION

