



UNIVERSITY OF MINNESOTA | EXTENSION

SOURCE

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Small grains, big benefits

IN THIS ISSUE:

Water quality

Nutrition education

New Extension faculty

SOURCE

SUMMER 2016

IN THIS ISSUE

Master Gardeners make a difference	Inside front cover
Small grains, big benefits	2
Widening the focus on water	4
Making the healthy choice the easy choice	6
Protecting tomatoes from disease	7
Cover crops	7
New faculty are driven to discover	8
4-H Science of Agriculture	Back cover

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Master Gardeners make a difference

Master Gardeners are your neighbors who volunteer to bring University horticulture information to local communities. They teach at schools, community gardens, youth programs, hospitals, retirement centers and homes for the disabled.

Through their work, community bonds are strengthened and Minnesota citizens are better equipped to make healthy choices in their gardening practices, promoting healthy plants for healthier people and a healthier planet.



Across Minnesota, Master Gardeners keep communities informed on topics such as increasing plant biodiversity, adapting to climate change, growing local food, supporting pollinators and conserving water.

www.extension.umn.edu/garden/master-gardener

2,380
MASTER GARDENERS

143,734
VOLUNTEER HOURS

212,404
MINNESOTANS REACHED

FPO

COVER: Extension conducts research and delivers education in Greater Minnesota communities. Collaborating with farmers, such as those growing wheat and other small grains, is one example. Pictured: Jochum Wiersma, Extension small grains specialist (left) with Ron Pomije and Ruth Hoefs, farmers in LeSueur County.

From the Dean

Discovering Extension in every county

This year, we are bringing greater awareness to the many ways Extension reaches all corners of Minnesota. In 2016, I will visit all our regional offices and as many counties as possible.

It is always so inspiring to spend time in Greater Minnesota—to see our work, meet with our staff and partners, and find more ways to highlight Extension’s education, research and impact.

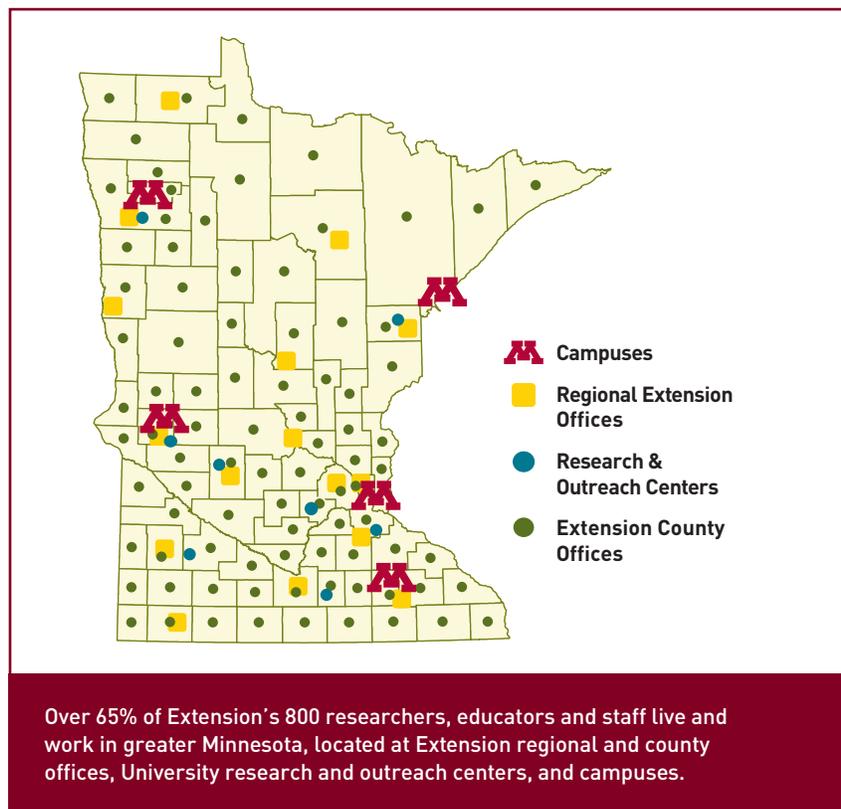
During these trips, I am visiting with Extension employees in the regional offices, meeting with donors and partners, attending local program events and conducting some media interviews along the way. I hope to see you during my travels!

This issue of *Source* highlights just some of Extension’s work in Minnesota. In addition to meeting our new faculty, you can learn more about Extension’s research on farms, water quality efforts, nutrition education, tomato disease resources, Master Gardener programs, and 4-H Science of Agriculture.

From Kittson to Houston, Rock to Cook, Traverse to Chisago, Roseau to Faribault—and all 79 counties in between, we’re proud to share the many ways that Extension connects with communities, partners and the University to address issues that matter most.

Sincerely,

Bev Durgan





A field of winter wheat planted in the fall by Extension specialist Jochum Wiersma (middle) emerges in the spring, bringing opportunities to test varieties and practices in the real crop production environment on Ruth Hoefs and Rom Pomije's farm.

SMALL GRAINS, BIG BENEFITS

Farmers participate in research with scientists and educators who know their world.

Ruth Hoefs and Ron Pomije's farmstead straddles the line between two townships in Le Sueur County. "Some of their crops and animals are in Lexington, and some are in Derrynane," says Diane DeWitte, a University of Minnesota Extension agriculture educator based in the area.

Their farm is also at the crossroads of Extension research and education. They are

in their sixth year of participating in trials meant to bring more wheat back to southern Minnesota after decades of farmers avoiding it due to low yields and disease problems. The study is one of over 100 Extension applied crop research projects taking place in Greater Minnesota.

"Not only can wheat come back stronger to some areas, but so can other small grains—oats, rye and barley," says Jochum Wiersma, the Extension small grains specialist conducting research on the Hoefs-Pomije farm as well as on farms in Benson and Kimball, with funding support from the Minnesota Wheat Research and Promotion Council.

Why conduct research on Minnesota farms?

"The research we're doing on farms complements that conducted on University research plots by providing a real farm-business environment," says Wiersma. "It gives farmers a voice."

"We want a diverse landscape on our farm, but it has to be worth it economically to grow more than corn and soybeans. So we get into a lot of back and forth discussions to figure that out," says Pomije.

"Our farmers in southern Minnesota want to learn how we can improve small

grain crops outside of where they have more typically been grown in northwest Minnesota,” says DeWitte. “Many farmers in our region have not grown wheat and other small grains for over 20 years.”

The goal is to bring research to the farm and have it applied—or adopted—quickly for further study, whether that be new varieties or new production practices. “It makes things a lot less abstract,” says Wiersma.

Research on real working farms brings in the agricultural community to see it in authentic environments. “Seeing is believing,” says David Nicolai, Extension crops educator. “Other farmers, crop consultants and seed salespeople—they come to learn from Extension and the farmer about their experiences. Then those people turn around and share new information with others in the community.”

Breeding improvements

Jim Anderson, a professor and wheat breeder in the University’s Department of Agronomy and Plant Genetics, consults closely with Wiersma on variety selection for the trials. “Our expanded work with Jochum Wiersma resulted in our ability to process data from twice as many plots as before,” says Anderson. “We’re learning more about yield, quality, diseases and more. And we can now shorten the time it takes to evaluate and develop new varieties.”

Agricultural groups complement the role that individual farmers play in the research trials. For example, data is available for analysis within hours of harvest because of technology onboard the farm equipment that the Minnesota Wheat Research and Promotion Council is providing for the trials.



Extension research takes place on farms and land across Minnesota, where community members can easily come to see results and consider their own options.

“We had our best wheat crop the last two years, and that was based on the varieties we selected and how we managed, all based on the data from the Extension project,” says Pomije. “And it feels good to us to know we are contributing to University research and education.”

Giving new crops a chance

Pomije and Hoefs started out growing small grains to “mix it up” a bit. Alternating crops on a field from one year to the next (called “rotating”) has a lot of benefits. Growing small grains and forage crops on fields that at other times grow corn or soybeans can improve soil health, reduce erosion, and potentially even reduce the need to fertilize the corn and soybeans.

Wheat uses less water too, so it lets the soil recharge for a season, and that helps the corn grown there later.

The wheat Pomije and Hoefs grow is used for milling into flour, but more and more Minnesota producers are finding new local markets in the growing brewery industry. “I wouldn’t mind getting into that,” says Pomije, who may try to grow barley next.

“It feels good to know we are contributing to University research and education.”

“Wheat, barley, oats and rye are all cool-season grasses, but advances are making them competitive again in the southern part of the state,” says Wiersma. “It isn’t an economic and environmental fit for everybody to grow these crops, but for those who are serious about it, Extension provides the research foundation for success.”



Partnerships with commodity groups, such as the Minnesota Wheat Research and Promotion Council, help fund Extension crop research. Pictured: Ron Pomije, farmer and Diane DeWitte, Extension agriculture educator in Blue Earth County.

SMALL GRAINS IN MINNESOTA

- Winter wheat, spring wheat
- Oats
- Barley
- Fall rye
- Spring triticale

Widening the focus on water

Water issues require integrated Extension research, education and community engagement

If you throw a stone anywhere in Minnesota, you're bound to make a splash. We're surrounded by nearly 12,000 lakes and 70,000 miles of rivers and streams. Minnesota has a total water surface area of around 13 million acres, almost as large an area as all of the state's corn and soybean acres in any given year. Minnesota has more wetland acres than any state except Alaska.

While all of this water makes for some excellent scenery, our economy depends on it too. From fishing and boating to parks, our water resources support a thriving tourism industry. In 2014, travel and tourism generated \$13.6 billion in gross sales for Minnesota. Then there is the economic impact of agriculture, which also depends on water.

Managing these resources while meeting our needs presents a host

of issues. Fortunately, the University of Minnesota is home to some of the world's most advanced water research.

"Because of the extraordinary water resources we have in Minnesota, geographically we're like a living laboratory," says Jeffrey Peterson, director of the University's Water Resources Center, a partnership between Extension and the College of Food, Agricultural and Natural Resource Sciences. "We've developed the capacity to address a whole range of water-related issues in many different fields of study."

As the University's connection to Greater Minnesota, as well as urban and suburban communities, Extension provides ongoing research and education on water resources to partners across the state.

www.extension.umn.edu/environment/water



Extension efforts provide a variety of opportunities to ensure our water remains healthy, safe, clean and abundant.

Starting at home

Water use in home landscapes accounts for nearly one-third of residential water use, totaling nearly 9 billion gallons per day.* Lawns are the single largest irrigated area in the U.S. Excessive watering impacts both availability and quality of drinking water. Extension tackles these challenges by conducting research and education on drought-tolerant, low-maintenance grasses. In addition, the Water Wisely educational campaign launched in spring 2016 teaches ways to better care for lawns, gardens and trees. And a recent grant from the Metropolitan Council is funding a new study of lawn irrigation practices and systems. *(EPA, 2013)



Making greens greener

Parks and golf course managers can make changes, such as turf selection and timing of treatments, fertilizer and watering, that make golf courses a better ecological fit near bodies of water. Through educational partnerships, such as the Great Lakes School of Turfgrass Science and the Minnesota Golf Course Superintendents Association Environmental Stewardship Program, Extension researchers share the science-based principles needed to effectively manage turf for parks, recreation and sports.



Stopping invaders

Minnesota's lakes, streams and shorelands are increasingly threatened by aquatic invasive species, endangering ecosystems, communities, fishing and tourism. We have few ways to address these threats, but new research is bringing progress. One strategy resulting from Extension's partnership with Minnesota Aquatic Invasive Species Research Center (MAISRC) uses "ecological niche modeling" tools to help predict the spread of species. Computer models analyze pathways of spread and where species will survive. Another strategy with Extension and MAISRC is the Aquatic Invasive Species Detector volunteer program, which will begin training volunteers in fall 2016.

Intro facts courtesy of Minnesota DNR and Explore Minnesota Tourism



Balancing nitrogen use

Nitrogen is the nutrient most often deficient for Minnesota crop production. But applications that exceed crop needs can result in excess nitrogen moving to ground and surface water in the form of nitrates. Through Nitrogen Smart, a new educational program made possible through a joint effort of Extension, the Minnesota Corn Growers Association and the Minnesota Agricultural Water Resources Center, agricultural producers learn to maximize return on their fertilizer investment while minimizing impacts on natural resources.



Informing aquaculture

Regional interest in aquaponics—growing fish and plants in water together for food, and growing algae for livestock feed and fuel—has been on the rise for years. But until recently, fledgling aquaponics businesses did not have a basis for how to ensure the safety of the food they produced. In response, University and Extension faculty and educators developed an aquaponics program. It includes an undergraduate course, research projects, continuing education opportunities and industry partnerships.



Responding to climate challenges

Climate matters to Minnesota. Transportation, agriculture and recreational infrastructures are based on it. Extension helps Minnesotans respond to challenges caused by changing weather patterns, such as flood and drought extremes. Extension’s Regional Sustainable Development Partnerships recently held climate change adaptation conversations in communities across Greater Minnesota, with support from the Steger Foundation and an Environmental and Natural Resource Trust Fund grant. Mark Seeley, Extension climatologist, led conversations about innovations and strategies at the household, farmstead and community level to adapt to a changing environment.



Engaging communities

Water can be controversial, but carefully navigated controversy can lead to resourceful decision making. Extension’s leadership and civic engagement education provides training for state agency staff, watershed managers, and Soil and Water Conservation District leaders to help them ask good questions, clarify issues and identify options before they decide on collective actions. As a result, more voices are heard and better decisions are made when they are informed by diverse community perspectives.





Extension SNAP-Ed educators like Rachel Jones (foreground) extend nutrition education to families by training food shelf volunteers and other partner organizations. Also pictured: Deisy De Leon Esqueda, director at ECHO Food Shelf in Mankato (back) and volunteers.

In 2015, Extension SNAP-Ed and 281 partners helped nearly 40,000 people make healthy food choices.

Making the healthy choice the easy choice

Extension SNAP-Ed creates greater impact through partnerships

When clients visit the ECHO Food Shelf in Mankato, they enter a place subtly structured to help them make nutritious choices.

Some of what clients encounter is visual—an appealing setting where fresh fruits and vegetables are displayed prominently, for instance. Other features are practical. Text messages encourage clients to pick up produce while it's fresh. Volunteers use “healthy nudging”—helpful encouragement and preparation tips that promote vegetables and whole-grain foods, without any “shoulds” or judgment.

All result from a partnership between ECHO and the University of Minnesota Extension’s Supplemental Nutrition Assistance Program-Education (SNAP-Ed).

SNAP, previously known as food stamps, helps low-income individuals and families buy food. Recipients include the elderly, families and veterans, many of whom are employed. Nearly one-third of households receiving SNAP food assistance have to

visit a food pantry to keep themselves fed, according to the United States Department of Agriculture (USDA). SNAP-Ed results in clients making healthy nutritional choices wherever they are. Both SNAP and SNAP-Ed are funded by the USDA.

Rachel Jones, Extension SNAP-Ed educator, leads Mankato-area programs that equip volunteers with approaches to “nudge” clients toward healthy choices. “We want to make healthy choices the easiest choices,” she says.

Deisy De Leon Esqueda, director at ECHO, says it makes a difference when Jones teaches volunteers just how to do that. “Our volunteers have contact with many families walking through the door every day,” says De Leon Esqueda. “For every volunteer trained by Extension, we reach many more clients with messages about how to be healthier, while treating them with respect and dignity.”

“With innovations such as the texting program we helped create, as well as volunteer education, we can extend our reach to more

people,” says Kelly Kunkel, Extension health and nutrition educator.

The ECHO-Extension collaboration corresponds with the USDA’s new SNAP-Ed guidelines, which move beyond Extension’s historic emphasis on direct education to creating changes that foster consumption of food that’s healthy, affordable and accessible, says Trish Olson, director of Extension family development programs. Olson and colleagues are working with obesity researchers in the University of Minnesota School of Public Health and elsewhere to study the effectiveness of their efforts.

Extension leaders began reframing statewide SNAP-Ed programs in 2015 to align with the USDA’s expanded direction. Providing education and research-based information to groups that work directly with SNAP recipients enables Extension to have a lasting influence on the wide scope of issues that impact nutrition.



Angela Orshinsky, Extension plant pathologist, studies diseases in a wide variety of horticultural crops.

Protecting tomatoes from disease

To meet the demand for fresh, local fruits and vegetables in Minnesota, many growers use high tunnels to protect their crops from weather extremes and extend the growing season. Unfortunately, the environment within a high tunnel can allow more plant diseases to thrive in the crop.

Angela Orshinsky, Extension plant pathologist, and Michelle Grabowski, Extension horticulture educator, visited 15 high tunnel tomato growers over two years to better understand what pathogens were causing disease problems in Minnesota's high tunnel tomato crop.

One result, a new guide titled "High Tunnel Tomato Diseases: A guide to identification and management," is now helping growers raise a healthy crop. z.umn.edu/hightunneltomatoes

Home gardeners, get help with tomato problems at z.umn.edu/15vu

COVERING MORE GROUND

Extension studies the benefits of keeping live plants in otherwise fallow crop fields

Cover crops—alfalfa, radishes, turnips, and more—have historically been grown after corn or other crops that are harvested in the fall, or anytime the ground is bare. For several years now, an increasing number of farmers have embraced cover crops as a way to anchor the soil so it won't erode and wash away and to prevent weeds.

It isn't always easy to grow cover crops in cold climates. New research is helping farmers determine what to grow, when to plant and what the full range of benefits includes.

Jill Sackett Eberhart, a University of Minnesota Extension crops educator, says research activity accelerated in Southeast Minnesota with participation from watershed managers. Besides preventing erosion, it appeared that the organic matter dying plants add to the soil helps a field absorb heavy rains without the water escaping to the nearest watershed.



But research was lacking, so Scotty Wells, an Extension agronomist and assistant professor, began carrying out replicated trials on multiple farms. Learning tours were also part of the strategy.

"Cover crops help," says Dean Thomas, a watershed manager in Fillmore County. "It's not the only thing that helps, but Scotty's been sharing the data and it's really caught people's attention."

"The advice I've been taking is to keep a living root in the soil as close to year-round as I can," says Jerry Ackermann, a participating farmer in Jackson County. The Ackermanns have been concerned about pollution problems in nearby Heron Lake and want to make sure they are doing their part to help.

Jerry and Nancy Ackermann have been involved with other Extension research projects, including a major research project with Jeff Coulter, Extension corn agronomist, and Liz Stahl, Extension crops educator based in Worthington. That study found that growing alfalfa reduces the need for nitrogen fertilizer for corn grown in the same field the year following an alfalfa crop.

"All of the years of itty-bitty cover crop projects have led to where we are now," says Eberhart. "The farmers who have collaborated on the research have certainly had some hassle factors to deal with, but they've also seen some of their own ideas put to the test and made a part of this whole new body of knowledge."

New Extension faculty are driven to discover



JOYCE SERIDO:

Engaging families to become financially capable

"How families communicate and interact about their finances can transform their economic well-being," says Joyce Serido,

Extension family finance specialist and associate professor in CEHD.

Serido's research findings are informing Extension programs that provide education for low-income families. A pilot program in 2015 and 2016 is helping families understand different types of college financial aid and ways to manage expenditures proactively to reduce potential for high levels of post-college debt. "My long-term research goal is to explore the connection between parenting practices and financial behaviors among low-income and diverse youth," she says.



JEFFREY PETERSON:

Leading the conversation about water resources

"One of the biggest challenges we face today is protecting the quality and supply of our water resources," says Jeffrey Peterson,

Extension economist and director of the University's Water Resources Center.

The center, a partnership between Extension and CFANS, provides objective, science-based information to help farmers, communities and governments make informed decisions that impact water quality. Peterson coordinates the efforts of faculty engaged in water-related science, policy and economic research.

Peterson says, "Our goal is to bring together different groups of people with different areas of expertise, to collaborate, encourage conversation and listen."



MATT RUSSELL:

Developing technology to help forests thrive

"Forests are one of our best tools to reduce carbon dioxide emissions," says Matt Russell, Extension specialist and assistant

professor in CFANS.

Russell uses the power of technology to help landowners and natural resource professionals better manage forests. He recently partnered with the USDA Forest Service to create the Forest Carbon Explorer, an app that uses forest inventory data to show how much carbon a forest can absorb.

"With one-third of the state covered in forest land, Minnesota can teach the world how to make sustainable decisions," Russell says. The forest industry contributes 60,000 jobs and over \$9 billion to Minnesota's economy.



JENIFER MCGUIRE:

Addressing family issues with information, compassion

Jenifer McGuire, Extension specialist in family relations and an associate professor in CEHD, is closing gaps for those who have

not been well served by parenting education. These include same-sex couples, such as those going through a divorce or break-up who still need to co-parent in ways that are healthy for their children.

McGuire is also a pioneer in research on the needs of transgender children. "Bullying is a common but harmful reaction toward gender-variant youth," says McGuire. "Their well-being improves when those who provide services are informed and when families and communities practice acceptance."



DAN LARKIN:

Protecting our lakes, rivers and streams

Dan Larkin and his team work to prevent the spread of aquatic invasive plant species. Larkin an Extension specialist in the

Minnesota Aquatic Invasive Species Research Center and assistant professor in CFANS.

"We want to support healthy lakes that benefit biodiversity, recreation, tourism, and the other goods and services that we value so highly," says Larkin. "We are taking a multi-pronged approach to understand what's driving the spread of invasive species, limit and control those species, and turn back damage that has been done."

Funding support from Legislative-Citizen Commission on Minnesota Resources/ Environmental and Natural Resources Trust Fund.



ASHOK CHANDA:

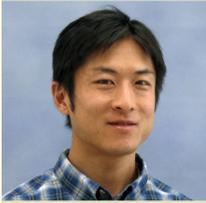
Detecting sugarbeet diseases

Sugarbeet growers need information on how to effectively manage plant diseases, but first they need to know which disease is present.

Ashok Chanda, Extension plant pathologist and assistant professor in CFANS, gives an example: "Root rot is a common symptom of disease, but a lot of diseases look the same. There are many diseases that can rot roots and they each require a different strategy."

Chanda is developing new molecular tools to detect and diagnose pathogens in the Red River Valley, where 600,000 acres of sugarbeets are grown. He is based at the Northwest Research and Outreach Center in Crookston.

Funding support from the Sugarbeet Research & Education Board of Minnesota and North Dakota.



KOTA MINEGISHI:
**Giving dairy producers
 the technology to succeed**

“The more dairy farmers are able to share information and collaborate, the better chance they have of succeeding,” says

Kota Minegishi, Extension dairy scientist and assistant professor in CFANS.

Minegishi is developing apps to help dairy producers and advisors see new opportunities, make better decisions, monitor risks, and use more precision in animal care and nutrition.

Minegishi says, “To compete today, dairies need to embrace the advantages provided by advances in technology.” The apps he and his team are developing will make the power of data more accessible to dairy producers.

New University of Minnesota Extension specialists have joint faculty appointments in University colleges:

- College of Food, Agricultural and Natural Resource Sciences (CFANS)
- College of Education and Human Development (CEHD)
- College of Veterinary Medicine (CVM)
- Humphrey School of Public Affairs



FERNANDO BURGA:
**Helping immigrant voices
 be heard**

“Our cities have large groups of people who are part of our daily lives, but are not represented in the decisions that shape

their lives,” says Fernando Burga, Extension civic engagement specialist and assistant professor in the University’s Humphrey School of Public Affairs.

Burga and his team are working to give immigrants and other underrepresented individuals a voice in political conversations about education, transportation, zoning and other important issues.

“By interviewing individuals and community organizations, we are able to understand their unique perspectives and share their stories with the larger community and decision makers,” says Burga.



SINISA VIDOVIC:
**Helping protect Minnesota’s
 poultry industry**

“Last year, more than 9 million birds on over 100 poultry farms died as a result of avian flu,” says Sinisa Vidovic, Extension animal

scientist and assistant professor in CVM. “Our goal is to interrupt the cycle of transmission of disease-causing microorganisms in environments associated with the poultry industry.”

Vidovic and his team are researching how pathogens sense and adapt to various environmental stressors in order to create new vaccines to stop the spread of diseases.

“There is tremendous potential for our research to naturally slow down pathogens, which could help poultry farmers produce healthier food with fewer antibiotics,” Vidovic adds. “This could have a far-reaching impact on the poultry industry.”



MATT CLARK:
**Studying grapes
 from vine to wine**

“Someday soon, you could be drinking wine from the new grape developed at the University of Minnesota, named Itasca,” says Matt Clark.

Clark, Extension horticulturist and assistant professor in CFANS, works with grape and wine experts from around the globe to breed new cold-hardy grapes in marketable styles. He also studies ways to use DNA tests to determine how seedlings will perform as adults, which could speed up the time it takes to breed new grape varieties.

“Minnesota grapes are good for our economy,” Clark adds. A recent Extension report showed that Minnesota cold-hardy grapes pumped \$401 million into the U.S. economy and created 12,600 jobs.



AXEL GARCIA Y GARCIA:
Innovating cropping systems

“Crops need water and nitrogen to grow, but excess nitrogen may pollute water. Cover crops can improve water and nitrogen use efficiencies in corn and soybean rotations,” says Axel Garcia y Garcia, an assistant

professor and Extension Agronomist in CFANS located at the Southwest Research and Outreach Center near Lamberton.

Remote sensing can detect nitrogen stress in cornfields. Crop models may be used to make fertilization recommendations. Garcia y Garcia is working on the integration of both technologies to deliver recommendations in near real time. “Improved technology helps farmers become more efficient and cropping systems more sustainable,” he says.

Garcia y Garcia holds the Wally Nelson cropping systems faculty position.



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4-H Science of Agriculture

Extension is growing the next generation of agricultural leaders

When University of Minnesota Extension 4-H challenged Minnesota youth to come up with science-based solutions to agriculture-related issues, the youth took “science-based” to heart.

A Meeker County 4-H team, for example, developed a 3-D printed ear tag that will allow farmers to electronically track and monitor their livestock using GPS technology. “We thought it would be helpful to be able to monitor livestock from a phone or computer,” says Andrew Massmann, age 16. “A family we know lives four hours away from one of their pastures.” Their mentor is Erik Hildebrand, a biologist from the Minnesota Department of Natural Resources who tracks Minnesota’s moose population.

4-H Science of Agriculture teams work with adult mentors to identify their issue and develop solutions. They practice presenting their results at spring regional events before moving on to a June statewide event at the University of Minnesota.

Minnesota agriculture leaders are excited about the 4-H challenge, becoming

expert mentors and providing financial contributions for grants and scholarships.

“Minnesota is facing a shortage of ‘ag literate’ professionals,” says Adam Birr, Minnesota Corn Growers Association executive director. “This program gives kids a wonderful hands-on experience digging into issues facing agriculture. By working with local ag professionals, they also get exposed to possible future careers at businesses in their communities.”

z.umn.edu/4HScienceofAg

 **2016 PARTNERS,
THANK YOU!**

Minnesota Corn Growers Association, AgStar, Pentair, American Crystal Sugar, Jennie-O Turkey, Rahr Corp., Minnesota Farm Bureau and Minnesota Farmers Union



Extension 4-H Science of Agriculture youth in Meeker County are developing a 3-D printed ear tag to monitor livestock using GPS technology. Watch a video about their experience at z.umn.edu/15zb.