

# SOURCE

Magazine of Extension research & education | Spring 2014

## 4-H Develops Future Scientists



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Today's agriculture

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Strengthening  
communities

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Minnesota wine

# SOURCE

SPRING 2014

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 UNIVERSITY OF MINNESOTA | EXTENSION



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**ON THE COVER:** A 4-H dairy project sparked a passion for science in Audrey Lane, a 4-H'er and University of Minnesota freshman. Audrey now studies genetics at the U. Extension's 4-H youth development program is a leader in the national 4-H initiative to bolster interest in STEM careers.

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University of Minnesota Extension mission: Making a difference by connecting community needs and University resources to address critical issues in Minnesota.

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# From the Dean

Creating a stronger Minnesota for over 100 years



Bev Durgan, Dean

In 2014, we celebrate the 100th anniversary of the Smith-Lever Act. This federal act established the Cooperative Extension Service, a partnership between the U.S. Department of Agriculture and land-grant universities to extend research-based knowledge through outreach education.

University of Minnesota was ahead of the curve, establishing Extension in 1909, five years before the 1914 federal act which established a state-by-state national network to improve the lives of families, youth, farmers, communities and businesses.

The Smith-Lever Extension vision is alive and well in Minnesota today. This issue of *Source* highlights stories of Extension's impact in our ever-changing world:

- Extension's 4-H youth program stimulates kids' interest in science, creating the next generation of scientists needed in the 21st century. Meet two 4-H alumni studying at the University of Minnesota.
- Investments in agricultural research continue to pay back, helping agriculture producers make informed decisions that benefit both farm businesses and the environment.
- Rural communities receive much-needed access to Extension research and education, helping them prepare for the challenges and opportunities of changing economies, demographics and technologies.

Your financial gifts help us extend the reach of Extension, creating a stronger Minnesota for the next 100 years. To make a gift, visit [www.extension.umn.edu/about/donate](http://www.extension.umn.edu/about/donate), or call (612) 624-7971 to speak to Jane Johnson, Extension development director, or Cara Miller, executive director of the Minnesota 4-H Foundation.

Sincerely,

Beverly R. Durgan  
Dean, University of Minnesota Extension

## Extension's volunteer workforce helps keep Minnesota strong

Across the state, Extension volunteers engage Minnesotans in education and research that changes lives.

It's happening every day, in every county of Minnesota:

- Communities learn how to build and maintain community gardens from **Master Gardeners**
- Minnesota youth learn how to lead and succeed with the help of **4-H club leaders**
- Neighbors learn how to conserve our environment with the help of **Master Naturalists**
- Parents improve their family's health and nutrition, learning from the **chefs and assistants of Cooking Matters®**

Extension volunteers give generously of their time and energy, but they also receive valuable support and education. Volunteers learn the latest research so they can share it with others, bringing new skills to their jobs, their homes and their communities.

To volunteer with Extension, visit [www.extension.umn.edu/about/volunteer](http://www.extension.umn.edu/about/volunteer).

Extension volunteers provide more than 1.16 million hours of service annually.





Inspired by her Extension 4-H experience, Audrey Lane entered the University's College of Biological Sciences, where she is a student of genetics professors David Greenstein (above) and Perry Hackett (see inside front cover).

# Building the next generation of STEM leaders

Extension's 4-H youth take their excitement for science to the University of Minnesota



**STEM =**

Science +  
Technology +  
Engineering +  
Math

STEM-related jobs are growing three times faster than other industries, but only 5 percent of U.S. students get their undergraduate degree in science and engineering. Hands-on experiences in 4-H STEM set Minnesota youth on a path to continued learning in college and careers.

Audrey Lane didn't care about genetics when her high school class was learning how a parent's genes determine their child's eye color. Her "aha" moment came during the Dakota County 4-H dairy project. Audrey learned how genetics factor into raising a healthy cow, including milk production values, which she was evaluated on during the Minnesota State Fair.

"4-H was the first place I learned the practical application of studying genetics," says Audrey, now 19 years old and majoring in genetic cell biology and development in the College of Biological Sciences at the

University of Minnesota. “4-H made the science real. Learning how genetics was used in the dairy industry made it seem much more important.”

In Waseca County, Ryan Strobel’s first in-depth experience learning about animal health came through the 4-H swine project. “In 4-H, I got to work with a vet and manage the pigs on my own. I learned how quickly their health could change, and the signs to watch for.” Ryan is now in his first year of the U’s VetFAST program, which was created to address the shortage of livestock veterinarians. VetFAST is a collaboration of the College of Veterinary Medicine and the College of Food, Agricultural and Natural Resource Sciences.

Sparkling interest in STEM is a priority for 4-H. “There is a critical need for skilled STEM professionals, nationally and in Minnesota,” says Dorothy Freeman, Extension associate dean for youth development and state 4-H director. “We know engaging youth in STEM at an early age increases the likelihood of their continued interest.”

“Kids sometimes think scientists just do experiments in labs, and engineers only

build and fix trains,” says Hui Hui Wang, STEM educator for Extension 4-H youth development and the University’s STEM Education Center. “When youth get to try and figure out how to design and build a robot that can collect water samples in a lake, they’re getting excited about engineering without realizing it. Then they learn that scientists and engineers are just like them, people skilled at asking questions, identifying problems and finding creative solutions.”

Building skills that can transfer to many careers is what 4-H does through its youth-driven experiential learning model. In fact, 4-H youth are more likely to pursue future study or careers in science, engineering or computer technology, according to a national study by Tufts University.

“The STEM jobs of 20 years in the future



Ryan Strobel, 4-H alum from Waseca County, continues his hands-on learning experience at the University of Minnesota.

don’t exist yet,” says Gillian Roerhig, associate director of the University of Minnesota’s STEM Education Center. “Youth need to learn critical thinking and problem-solving skills, which are necessary to succeed in any STEM-related job.”



## WANTED: Future scientists and engineers

For the U.S. to generate 20 percent of its electricity from wind power by 2030, utilities, manufacturers and communities will need hundreds of additional wind power professionals.

## Harnessing the power of 4-H youth

Layton Wittnebel, age 12, has always loved robotics, so he jumped at the chance to learn the newest twist—4-H Turbotics—applying robotics to wind energy.

It’s easy to see why 4-H, part of University of Minnesota Extension, is like a 4-H’er’s first University of Minnesota class.

Layton’s 4-H Turbotics class was held at the University of Minnesota West Central Research and Outreach Center (WCROC) in Morris. In 4-H Turbotics, 4-H’ers gain engineering skills and explore alternative energy technology using Lego Robotics, wind turbines and solar panel kits. They compete in a challenge to design a machine that yields the highest energy output.

They also learn about research and careers from Joel Tallaksen, a renewable energy scientist at the WCROC. Tallaksen is one of the scientists involved in the University’s recent success producing fertilizer from wind. It’s another example of 4-H’s connection to University research.

4-H youth also have a chance to take on leadership roles and help educate others. As a Lac qui Parle County 4-H youth leader, Layton will guide his club in the newest 4-H STEM project. “We learn how to help without taking over,” says Layton. “It’ll be fun to help the younger members progress, like other people did for me.”

# Meeting the challenges of today's agriculture

Modern farming is more complex than ever



Jeff Gunsolus, Extension weed scientist, updates Christian Lilienthal on herbicide-resistance research. Lilienthal is an Extension educator in Nicollet County who informs local farmers coping with the challenge.

Fields with ragweed and waterhemp plants, standing tall and green, remind Jeff Gunsolus of the stubborn nature of weeds. Many hoped planting genetically improved seeds would eliminate weed problems, but herbicide-resistance changed that.

“Weeds are adaptable,” says Gunsolus, Extension weed scientist. “They develop genetic resistance when they are exposed to the same herbicide year after year.”

Agriculture keeps advancing, adapting new technology to meet the needs of an increasingly global economy. Caring for the land, while ensuring that it continues to produce the food and energy needed for an estimated population of 9.6 billion by 2050, requires informed decisions. Extension helps agriculture producers make the best decisions based on the latest research.

## CULTIVATING CROP SOLUTIONS

Extension research and education guides growers on how to cope with extreme weather, insects, weeds and diseases

### SMALL GRAINS

Wheat, barley, oat, rye and triticale are some of the small grains grown in Minnesota. Since the mid-1990s, wheat yields in northwest Minnesota improved by about 1.6 bushels per acre per year, due in part to Extension research and guidance on varieties, protein content, strength, and management of diseases such as scab and leaf rust.



# From horses to high-tech

Gunsolus has devoted more than 30 years to long-term research into the complexities of weed control, providing data that show farmers how and why they need to diversify strategies to keep weeds from robbing yields.

Like other Extension researchers, Gunsolus works with regional and county-based Extension educators to ensure the latest research makes its way to the farmers who produce today's crops.

"We're in a different game now," says Extension educator Christian Lilienthal. "People in agriculture can't base this year's decisions on what they did last year." Lilienthal, who lives and works in Nicollet County, works with Gunsolus and other scientists to help local growers make good decisions in real time.

## Facing complex issues

Water is a significant challenge in the complex industry of agriculture. Access to it is one issue. Keeping it clean is another.

Farmers need nitrogen and other nutrients in order to have fertile soils and healthy crops. Like all business owners, they want to operate at the top of their capacity, but they also want to be good stewards of the land. So they learn strategies from Extension to reduce negative impacts while maintaining optimum yields.

Precision agriculture is one growing area, with high-tech systems identifying nutrient needs precisely, so farmers can target rather than broadcast applications. New, innovative solutions are also generating interest, like buffers and other forms of conservation drainage that absorb nitrogen before it can enter bodies of water.

"It's never certain what challenges the next year will bring farmers," says Gunsolus, "but Extension is always ready to work with farmers for the best outcome for both land and business."



Farmers controlled weeds with horse-drawn cultivators in 1914 when Congress passed the Smith-Lever Act that created Extension federally. (University of Minnesota was ahead of the curve, creating Extension in 1909.)

Bert Enestvedt, whose grandfather farmed with horses and oxen, was born six years after national Extension was created. Extension bulletins dating back to 1914 are stored in the family archives, evidence of the research Extension made available to the Enestvedts and other farmers across the state.

"Extension has always been concerned with agriculture and a respected authority," says Enestvedt, a founding director of the Minnesota Soybean Growers Association. "The University was often almost our sole source of information."

Enestvedt has since lived to see his family's Sacred Heart land farmed with tech-guided tractors. Advanced machinery is needed for farmers to be able to feed an estimated 9.6 billion people in 2050. Extension continues to study new technology and help the Enestvedts and other farmers decide how to apply it on the farm.



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## CANOLA

Minnesota canola was on a downward trend for many years when growers couldn't achieve profitable yields. Now, Extension plant pathologist Madeleine Smith partners across the region to address issues like yield-robbing white mold and flood damage. She says Minnesota can compete in the growing marketplace for the healthy oil canola produces.



## POTATOES

The heavy black soil of Minnesota's Red River Valley makes this region the nation's top red-potato producer. In the lakes regions, fertile sandy soils grow potatoes used for baking, fries and chips. Because potatoes are sensitive to herbicides sprayed on neighboring fields, Extension potato agronomist Andy Robinson is researching how to minimize exposure.



## FRUIT AND VEGETABLES

Minnesotans have increased access to fresh, local vegetables in recent years, thanks to season-extending technologies such as high tunnels. Extension conducts research in 15 University high tunnels and with 21 growers. Integrated pest management strategies inform those growers, as well as fruit orchardists and producers of peas, beans and sweet corn.



# Creating stronger communities

Communities in Greater Minnesota rely on Extension to discover strengths and realize potential



Akeley's Chamber of Commerce knows that small businesses help their community thrive, so they brought Extension classes on digital marketing to small business owners like Sandy Fynboh Andress of Blue Sky Beads.

Rural communities do not have access to the same resources as urban areas and suburbs. Extension helps these communities by providing reliable information and analysis, improving the processes they use to make decisions, and expanding the pool of people ready to lead.

## Acting on a vision

Three years ago, the small town of Akeley got involved in an Extension-led effort to help rural communities maximize their use of high-speed internet. Now, the quality of life in Akeley is growing in steady increments, and so is local confidence.

Blue Sky Beads is a seasonal store, nestled among the pine trees just outside of Akeley proper. But with the internet and social media, business doesn't have to exist solely for cabin-goers during tourism season.

Owner Sandy Fynboh Andress wasn't so excited about e-marketing before she took classes from Extension. "The classes were

the key to changing my mindset," she says. "Understanding e-marketing became a foundation for our local businesses, one that we need to keep building on."

## Building upon local assets

Perhaps the greatest outcome for Extension's work with Akeley is a revitalized Chamber of Commerce, which works with—and is made of—local businesses like Blue Sky Beads. Its forerunner civic organization had dwindled to only four people.

Today, the chamber has more than 40 active members and a new energy. The revitalized chamber is capitalizing on natural assets while unearthing others. Akeley is at the headwaters of the Crow Wing chain of lakes and stakes a claim as Paul Bunyan's birthplace.

"It's a lot of work and it takes a lot of people," says Peg Davies, chamber board member. "It's been great to work with Extension because of the connections

we've created with other communities and the resources to help us succeed."

In fact, others are now turning to Akeley in hopes of replicating the town's success in efforts such as the Chamber's online shopping site and social media for marketing town businesses.

Meanwhile, Andress will keep using the new knowledge in her business. Selling one-of-a-kind pieces of wearable art has some unique

**"It's been great to work with Extension because of the connections we've created with other communities and the resources to help us succeed."**

challenges, but she's motivated. "I'll have to tweak some things this year," she says. "It's like climbing stairs. We have to keep climbing."

# Dissecting the economy

## Communities need good data to make good decisions

The dynamics of the retail industry in Greater Minnesota reflect a growing regionalism. Minnesotans often live in one town while they work and educate their children in another. And, they shop in many different communities.

To help retailers understand this dynamic and respond, Extension provides retail trade analyses to towns throughout the state. Extension community economics educators like Bruce Schwartau scrutinize reams of data on spending patterns and help leaders understand how to boost retail business success.

This resulting “deep dive” helps leaders better understand how to optimize spending in their communities. Extension conducted more than 50 applied-research projects in 2013.

Understanding where the dollars flow informs local decisions. “We know that people drive 40 miles or more to shop in places like Fairmont in Martin County,” Schwartau says. “What does that mean for the rest of the region? By examining a host of factors, communities throughout Martin County can work together and choose their plan to share and expand the retail pie.”



Bruce Schwartau, Extension community economics educator, presents an analysis to the Winona Area Chamber of Commerce.

## Preparing new leaders

Research backs up what Davies learned in Akeley. It does take a lot of people to lead communities and organizations like a Chamber of Commerce. In fact, one in 34 residents in rural areas must serve in a leadership position, compared to one in every 143 in major metropolitan areas.

Rural leader positions are most frequently filled by older residents, those with high incomes and business owners. Through Extension leadership and civic engagement programs, communities are engaging a wider spectrum of community members, including new immigrants, younger adults and residents with diverse incomes.

“We want those involved to mirror the dynamic demographics of Minnesota’s communities,” says Toby Spanier, Extension leadership educator. “Our civic life has to represent multiple perspectives so that solutions work for everyone.”



Extension helps Minnesota cities and towns of all sizes learn about their strengths and take steps to improve their potential.

## CHECKLIST FOR STRONG COMMUNITIES

### Communities thrive when leaders and community members:

- Recognize** and understand their situation
- Have greater confidence** that they can manage change
- Act** to move toward a desired vision
- Respond** to opportunities and challenges
- Work through** limitations, differences, interests and other barriers
- Consider** the impact of their actions on the greater community

# Parents Forever™

Helping separated and divorced parents determine what's in their child's best interest



Extension's Parents Forever™ course has reached more than 40,000 parents in Minnesota and eight other states.

More than a quarter of all children will not live with both parents throughout their childhood. The stress of separation and divorce can have a profound impact on a child.

In 1998, the Minnesota Supreme Court aimed to help divorcing parents manage issues in a way that was best for children. They knew education would be needed, and the legislature agreed. Thus, Minnesota Statute 518.157 was enacted to reduce the risks a family break-up presents for children. The statute mandates co-parenting education for divorcing parents. Extension's Parents Forever™ is one course many judges count on.

"The way Parents Forever™ was structured and developed according to research made it exactly what we wanted. It set the standard," says Judy Nord, Minnesota Supreme Court staff attorney.

"It is possible for separated and divorced parents to create a new path in life and help their children get through the transition," says Ellie McCann, Extension family relations educator. That path starts with the 8-hour Parents Forever™ course delivered by Extension-trained facilitators from community-based agencies.

Extension also developed an online version of Parents Forever™, which increases participation because judges no longer need to waive the course due to travel hardships.



Judge Michelle Lawson

## Moving families forward

Parents often make the situation worse by putting children in the middle of their conflict, according to Sue Quamme, Parents Forever™ coordinator and teacher in Clay County. "We teach them strategies to keep the conflict out of it when talking to the kids."

Judge Michelle Lawson, who is chambered in Clay County, sees

the effect. "Parents who don't learn strategies keep having conflicts they can't resolve themselves. When they take the course and create a parenting plan, they don't have to keep coming back for modifications on custody, visitation and other issues."

Parents Forever™ teachers like Quamme, trained by Extension, work with individuals to meet their needs, whether it's their work schedule, location or what stage they are at in their family transition.

Mothers and fathers from each family usually attend classes separately, but classes include both men and women, which broadens perspectives.

"I tell parents that how you move forward as a newly defined family will be determined by how you act, interact, and react with one another," Lawson says. "And the children will take the lead from their parents."

## Parents reduce effects of divorce on children when they:

- Avoid putting children in the middle of conflict
- Create a formal co-parenting plan
- Learn to communicate about parenting decisions



**Minnesota wineries offer an experience for tourists and locals alike.**

Pictured: The winery at Alexis Bailly Vineyard produces award-winning wines from cold-hardy grapes, such as Frontenac, developed at the University of Minnesota.

# Minnesota wine comes into its own

## Extension study shows economic value of wine industry, challenges ahead

Fifteen years after the introduction of cold-hardy grapes to Minnesota, a burgeoning vineyard and winery industry has taken root.

Last summer, University of Minnesota Extension economic impact analyst Brigid Tuck completed the most exhaustive analysis of Minnesota’s wine industry since its inception.

“Like any enterprise, Minnesota’s wine industry will need to keep evolving and stay savvy,” she says. “It’s no longer a novel enterprise.”

Among her findings: In 2011, the most recent year data could be studied, the wine industry contributed \$59 million to Minnesota’s economy. Also, Minnesota’s wine industry is a largely rural phenomenon. Nearly 63 percent of all Minnesota wine is purchased at the vineyards and wineries that pepper the landscape, mainly in the southern part of the state.

To keep a steady stream of customers, vintners have focused on event marketing. Weddings, concerts, charity events and other “draws” expose new customers to Minnesota wine and keep customers coming back. Continued collaboration in agri-tourism efforts like wine trails, which connect vineyards and wineries through various points in rural Minnesota, holds market growth potential, Tuck says.

“Business at our winery doubled last year because of events,” says Terri Savaryn, co-owner of Sovereign Estates Wine in Waconia and communications chairperson for the Minnesota Grape Growers Association. She focuses on corporate events, grape stomps, hors d’oeuvres classes and concerts.

The development of cold-hardy grapes—including Frontenac, La Crescent and Marquette—helped make the University of

Minnesota a nationally respected leader in wine grape research. Owners of 101 vineyards and 34 wineries in Minnesota responded to the survey Tuck carried out with University applied economics professor William Gartner.

During its comparatively short life, Minnesota’s wine industry has been able to track its growth, thanks to two major studies undertaken at Extension. “Because Extension reports are carried out independently, grant-makers and other investors trust the information,” adds Savaryn.

The ability to pinpoint challenges and opportunities has offered this distinctive member of Minnesota’s agricultural community the data it needs to plan for smart growth. Nearly 76 percent of Minnesota wineries plan expansion within the next five years, as do 50 percent of the vineyards.

## BEYOND THE BOTTLE

**Marketing-savvy wineries bring in customers by hosting tastings, classes, concerts and events. Minnesota’s wine and grapes industry is aging well:**

- 34 wineries
- 101 vineyards
- 4 distinct wine regions
- \$59 million annual economic impact



**Visitors to a summer grape stomp at St. Croix Vineyards in Stillwater come away with enough bottles of wine and memories to last until their next visit.**



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## Create a honey bee haven

Eating bee-pollinated fruits and vegetables keeps us healthy. Yet bees are not as healthy as they used to be. In fact, populations are in decline in Minnesota and nationally. Fortunately, there are steps you can take to help bee populations: plant bee-friendly plants and reduce pesticide use.

University of Minnesota Extension has maintained an internationally recognized honey bee program since 1918. Marla Spivak, professor and Extension entomologist, recommends two steps for better bee health this growing season:

**PLANT BEE-FRIENDLY FLOWERING PLANTS.** Bees need flowering plants for nutrition. Bee balm, anise hyssop, lupine, asters, Autumn Joy sedum, sunflowers, and herbs like thyme and oregano are a few good choices. Plant flowers in yards, in public spaces, and on farms as borders and hedgerows. Farmers contribute to bee nutrition with alfalfa, clover, and other flowering forages and cover crops.

**REDUCE PESTICIDE USE.** Select healthy, natural plants and keep them free of pesticides. Avoid buying plants treated with neonicotinoid and other systemic insecticides, which remain present in the leaves, pollen and nectar of the plant. Many plant pests cause only temporary, aesthetic problems that can be managed or tolerated. If you do use pesticides, read the label and follow directions.



Bee Balm



Lupine



Calico Aster

### LEARN MORE:

**Extension's honey bee resources:**

[www.extension.umn.edu/garden/honey-bees](http://www.extension.umn.edu/garden/honey-bees)

**Bee-friendly plants:** [www.BeeLab.umn.edu](http://www.BeeLab.umn.edu)