



LEOPOLD CENTER  
FOR SUSTAINABLE AGRICULTURE

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## Crop rotation study makes national media splash

By MELISSA LAMBERTON, Leopold Center graduate research assistant

A recently published study with Leopold Center origins that shows how diversifying crop rotations can create profitable and sustainable farms has found an enthusiastic audience.

The experiment, begun in 2002 at ISU's Marsden Farm with funding from the Leopold Center and the U.S. Department of Agriculture, compares a conventional corn-soybean system with two alternatives, a three-year rotation that adds small grains and a red clover cover crop, and a four-year rotation that adds small grains and alfalfa hay.

Nine years of data show that the more diverse rotations greatly reduce the need for fossil fuels, herbicides and synthetic fertilizers without sacrificing yields or profitability.

"I've been surprised at how much attention this study has garnered in newspapers, magazines and blog sites," said Matt Liebman, ISU agronomy

professor and a principal investigator of the project.

The results were published in a peer-reviewed online journal, *PLoS ONE*, on October 10. Since then the article has been viewed more than 15,000 times. The research has been featured in national media such as the *New York Times*, *Discover*, *Wired Science* and *Grist*, as well as local and regional newspapers and the radio programs *Talk of Iowa* and *Successful Farming Radio*.

Social media is buzzing about the research, too: The study has been tagged in more than 350 Facebook posts and 100 Twitter tweets.

"Nothing else I've ever researched has had that kind of readership," Liebman said. "I'm not sure why the article has resonated so strongly, but it may be because it has a positive message: We can have highly productive, profitable

**ROTATIONS** (cont. on page 4)

## Spencer Award presented to CSA farmers

The owners of a Community Supported Agriculture (CSA) enterprise in northern Iowa have been chosen as the 2012 recipients of the Spencer Award for Sustainable Agriculture.

Jan Libbey and Tim Landgraf, who operate One Step at a Time Gardens near Kanawha in Hancock County, will receive the award from the Leopold Center on January 11. The presentation will take place during annual conference activities of Practical Farmers of Iowa, where Landgraf serves as president.

The Spencer Award honors farmers, teachers and researchers who have made a significant contribution to the ecological and economic stability of Iowa's family farms. It has been presented annually since 2002 and includes a \$1,000 cash prize from an endowment established by the family of Norman and Margaretha Spencer, who farmed near Sioux City for 40 years. The Spencers believed that is the obligation of each generation to leave the world a healthier and better place for the next generation.

More about the winners, page 8.

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LEOPOLD CENTER

### LEOPOLD LETTER MISSION

The mission of the *Leopold Letter* is to inform diverse audiences about Leopold Center programs and activities; to encourage increased interest in and use of sustainable farming practices and market opportunities for sustainable products; and to stimulate public discussion about sustainable agriculture in Iowa and the nation.

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The Leopold Center for Sustainable Agriculture seeks to identify and reduce adverse socioeconomic and environmental impacts of farming practices, develop profitable farming systems that conserve natural resources, and create educational programs with the ISU Extension Service. It was founded by the 1987 Iowa Groundwater Protection Act. The *Leopold Letter* is available free from the Leopold Center at 209 Curtiss Hall, Iowa State University, Ames, Iowa 50011-1050; (515) 294-3711.



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# Research Results

On the Web: [www.leopold.iastate.edu/grants/completed](http://www.leopold.iastate.edu/grants/completed)

## Summaries

Easy-to-read summaries are available for these recently completed projects funded by Leopold Center competitive grants.

- Connecting family, community and health from a food system perspective
- Conversion to perennial vegetation: Quantifying soil water regime, aeration and implications for enhancing soil resilience to climate change
- Credit, crop insurance and sustainable agriculture
- Defining the grazing season of restored natural grasslands
- Developing production, processing and marketing of aronia berries on small family farms in southeast Iowa
- Evaluating denitrifying bioreactors for edge-of-field nitrogen management in Iowa's tile-drained landscapes
- In good company
- Meeting on-farm energy needs through conservation, efficiency and renewable energy
- Optimizing buffers strips for improved ecosystem services
- Soil moisture dynamics and plant transpiration under contrasting annual-perennial cover types

## Scientific Journals

Leopold Center-supported projects have produced these papers published in peer-reviewed journals. Check at a research library or the journal's website for an abstract or full report.

- Bear, Douglas A.; J. Russell and D. Morrical (2012). Physical characteristics, shade distribution and tall fescue effects on cow temporal spatial distribution in midwestern pastures, *Rangeland Ecology & Management* 65:401-408. <http://dx.doi.org/10.2111/REM-D-11-00072.1>

*This work was conducted as part of a three-year project that tracked cow movements with GPS collars, showing how size and shape determined the amount of time cattle spent in/near streams and in shade [E2009-08].*

- Davis, Adam; J.D. Hill, C.A. Chase, A.M. Johanns and M. Liebman (2012). Increasing cropping system diversity balances productivity, profitability and environmental health, *PLoS ONE* 7(10): e47149. <http://dx.doi.org/10.1371/journal.pone.0047149>

*This research compares conventional with extended rotations at ISU Marsden Farm [E2010-02].*

## Landscape Biomass project seeks biofuel options

The Leopold Center has developed a new brochure about the Landscape Biomass project, which is in its fourth year of a planned 10-year study. The experiment at ISU's Uthe Farm compares replicated plots of five potential biofuel feedstock cropping systems: continuous corn and four alternatives that include soybean, triticale, switchgrass, sorghum or aspen trees. The cropping systems are planted at five different positions on the landscape, from the summit of the hill to the floodplain. Find the brochure on the Leopold Center Pubs & Papers webpage.

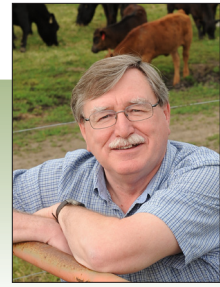
Corn has been the highest yielding crop in the first three years of the experiment. Researchers expect corn yields to stabilize or decrease slightly over time and perennial crop yields to increase as they mature. At present, none of the alternative systems are economically competitive with corn.

Yet the experiment shows that continuous corn has serious environmental impacts, particularly to water quality, a growing concern in Iowa. Samples of soil moisture drawn from the corn plots have contained the highest levels of nitrogen compared to the other systems. In contrast, the aspen tree system, intercropped with triticale, had almost no nitrogen in its soil moisture. Alternative systems also seem to create healthier soils by building organic matter and recycling nutrients. Early research indicates they may have lower greenhouse gas emissions as well.

# Conversations

WITH DIRECTOR MARK RASMUSSEN

## Lessons from our farming past



I believe that sustainable agriculture looks forward, not backward, but this does not mean that we can't learn from our agricultural history. My family's farming history offers a look at the changes in livestock and crop production and the effects of long-term agricultural cycles.

An October 1904 newspaper article about my great grandfather's farming partnership near Luton, Iowa ("Making Money on a Farm of Ten Thousand Acres," *The Farmers' Tribune*), reflected the turmoil of the times. President Theodore Roosevelt led the country in what became known as the "Progressive Era." His administration pursued anti-trust enforcement actions to end industrial concentration by large companies such as Standard Oil. Roosevelt, an avid outdoorsman, sparked a conservation movement to preserve natural resources which had been over-exploited for decades. He set aside more land for national parks and forests than all his predecessors combined and established the U.S. Forest Service to oversee much of this land. Aldo Leopold began working for this new Forest Service in 1909.

The early 20th century was a time of relative prosperity and growth for agriculture. Post-Civil War settlers on homesteaded land built farms and communities throughout the Midwest. Exploitation of the western region's resources by large, investor-driven cattle and wheat production operations in the late 1800s led to financial woes and collapse. By the 1900s, these large units were replaced by operations devoted to better farming practices and resource management. Farmers were beginning to employ new mechanized technology, although the classic row-crop tractor, industrial nitrogen fertilizer and plant hybridization were not yet available. The national corn crop in 1903 was estimated at 2.2 billion bushels selling for \$0.35-\$0.40 per bushel.

Against that background, my great-grandfather's farming operation was large both by latter-day and modern standards.

Family lore is unclear how this much capital and land (initially in Iowa and Nebraska) was accumulated, other than through mortgage debt, and operational leverage perhaps combined with some speculative intent. The primary cash enterprise was cattle production (about 5,000 head fed and marketed per year in 1904) and these cattle were driven north to the Sioux City Stockyards at the mouth of the Floyd River. The main operation near Luton produced forages, hay and grain for the cattle feeding operation. It included farmland in the Missouri River flood plain and the adjacent loess hills. Crop rotations on the farm were not ideal by any measure because much of "bottom" land (which had been tile drained at a cost of \$7-8 per acre) was planted in continuous corn for 7-10 years. Cattle manure was applied as the primary means of soil fertility management. The hill land was used primarily for pasture and forage crops.

Realizing that his intensive cropping plan presented problems, my great-grandfather was reported by the paper to be an advocate of alfalfa and clover combined with shorter rotation intervals. Multipurpose legumes were useful for crop rotation, building soil fertility and cattle feed. "One thing is the striking success obtained on this farm with alfalfa and clover," the report noted.

My purpose in sharing this story is not to bore you with my family history, but to emphasize several interesting points about farming. First, corn production has been important to Iowa agriculture for many generations and its cultivation has extensively altered the landscape. Little thought was given to the prairie ecosystems that were being plowed and Ada Hayden, who was 20 at the time, would not become influential in prairie preservation until after returning to teach at Iowa State in 1910. The challenge to maintain productivity and soil fertility using technology of the day required manure, legumes and crop rotations. Crop rotations worked, and I suspect my great-grandfather became a

proponent for the very practical reason that they proved profitable.

The other key observation is the cyclic nature of agriculture. My great-grandfather's farming operation grew to 80,000 acres in five states by 1916, but the operation was fragile, over-leveraged and financially at risk. When farm prices (especially beef) collapsed after World War One, his operation was vulnerable and the existing mortgage debt and operational leverage overwhelmed him. After several years of dealing with declining economic conditions, he died in 1922 at the age of 61. Most of the land went into receivership and was dispersed to satisfy creditors. The great American tradition of "boom and bust" prevailed.

American agriculture finds itself in yet another cycle of aggregation and concentration. "Get big or get out" has been a common refrain for decades. Technology, weather, credit, labor, regulations, law and government intervention contribute to the ebb and flow of economic trends of aggregation or disaggregation. At times being large offers an advantage while under different conditions being small and flexible is favored. One never knows when key factors might change, alter the economic landscape and put the status quo at risk. My great-grandfather probably never fully appreciated the threat that leverage, weather, the European market and falling domestic commodity prices posed to his business until it was too late.

The lesson I've learned is to be watchful and vigilant – to live and design my living with the potential for change in mind. I think about this as I work on sustainable agriculture. We should never assume that tomorrow will be just like today, because change happens. Let's be ready for it.

*Mark Rasmussen*

See historical report: [www.leopold.iastate.edu/news/leopold-letter/2012/Winter/director-lessons-farming-past](http://www.leopold.iastate.edu/news/leopold-letter/2012/Winter/director-lessons-farming-past)

## LONGER ROTATIONS ARE PROFITABLE, SUSTAINABLE

ROTATIONS (continued from page 1)

farming systems that do a better job of protecting the environment.”

### Saving money on inputs

Although corn and soybean are grown less frequently in the diverse rotations, they have higher yields when they are planted in diversified cropland: an average of 4 percent greater for corn and 9 percent greater for soybean.

There were no differences in profits between the three cropping systems, for either the “start-up” phrase of the experiment (2003 to 2005) or the “established” phase (2006 to 2011). Despite high prices for corn and soybean, the diverse rotations had the advantage of significantly lower input costs, particularly fertilizer. With periodic applications of cattle manure and nitrogen fixation by clover and alfalfa, the diverse rotations required 80 to 86 percent less synthetic nitrogen.

Diverse rotations consumed approximately half the energy required annually by a conventional corn-soybean system, making farmers less vulnerable to the rising costs of fossil fuels. Researchers also found that they could effectively manage weeds with 86 to 90 percent less herbicide.

### Environmental health

Input reductions offer environmental benefits as well as financial ones. Diverse rotations can improve soil quality, diminish erosion, protect nearby streams from pollution and reduce the risk of creating herbicide-resistant weeds. After nine years, the herbicide-related freshwater toxicity associated with the diverse rotations was 200 times lower compared to the conventional system.

Additionally, with living roots in the ground for longer portions of the year, the land is more likely to withstand severe weather events without losing topsoil or crops.



Matt Liebman, ISU Agronomy

### ‘A third path’

Liebman envisions that these diverse farming rotations would be coupled with livestock operations. Alfalfa and small grains can provide forage for livestock, thus contributing to the global food supply, while the livestock in turn supply manure that enriches soil at little cost to the farmer.

Integrated crop-livestock farming systems were common in much of North America until

the 1960s, when the availability of low-cost fertilizer encouraged farmers to specialize. The rising cost of fossil fuels, concerns about human and environmental health, and the advantage of new knowledge and modern technology could make diverse rotations an attractive option for the future.

Mark Bittman, who brought the study to national attention in a *New York Times* blog posting, called the research a “third path”

between conventional and organic agriculture. Barriers to taking this path include the increased management time, skills and labor required, as well as policies that incentivize corn and soybean and the lack of strong markets for alternative crops. An absence of costs assigned to environmental damage associated with farming systems is an additional impediment.

Nevertheless, Liebman feels optimistic about the practical impact of the study. “We can see what a well-functioning system looks like, and we can see what it looks like today,” he said. “Implementing diversified farming systems on a broad scale will require some new policy incentives, but this research shows that we can meet the technical challenges.”

The research has been funded with competitive grants from the Leopold Center, the USDA National Research Initiative, the Iowa Soybean Association and the Organic Center.

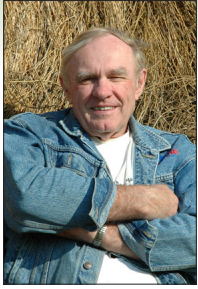
Visit the Leopold Center website to download the research article and read answers to frequently asked questions.

[www.leopold.iastate.edu](http://www.leopold.iastate.edu)

Frequently Asked Questions:  
[www.leopold.iastate.edu/faq-cropping-system-diversity-profitability](http://www.leopold.iastate.edu/faq-cropping-system-diversity-profitability)



Experimental plots at ISU Marsden Farm diversify the corn-soybean crop rotation with red clover (foreground), alfalfa and small grains (photo by Matt Liebman).



TOWARD A SUSTAINABLE

Future

## The challenge of ending hunger

The current issue of the *Journal of Sustainable Agriculture* (July-August 2012) contains an editorial crafted by five of our leading thinkers in sustainable agriculture. The title of their editorial is sagacious: “We Already Grow Enough Food for 10 Billion People . . .

and Still Can’t End Hunger.” As the authors unequivocally stated, “Hunger is caused by poverty and inequality, not scarcity.”

This suggests the need for a conversation that farmers in the industrial world are seldom encouraged to have. The warning that farmers constantly hear is “How are we going to feed 9 billion people by 2050” with the implication that they have a moral obligation to simply bear down and continue to do whatever is necessary to increase their yields of a few commodity crops in order to “feed the world.” This continues despite the fact that Mark Muller and Richard Levins pointed out in 1999 that “less than three-tenths of 1 percent of our total corn exports” went to countries “with at least 35 percent of their populations undernourished.” (Muller, 1999). The reason is obvious: “people making less than \$2 a day – most of whom are resource-poor farmers cultivating un-viably small plots of land – cannot afford to buy this food.” (Holt-Gimenez, 2012)

So how do we go about addressing the problem of hunger? The United Nations has issued four reports in the past five years on common themes that point to new, practical directions for solving the problem of hunger. While each report contains nuances that focus on different aspects of the same problem, all point in the same general direction. New technologies and increased yields in the industrial world may play a minor role in meeting this challenge. The central issues that remain to be addressed are empowerment of local farmers using agro-ecological methods, making food accessible to all (especially the poor), investment in agricultural knowledge adapted to local ecologies, multi-stakeholder participation and the empowerment of women!

Some of the reports are relatively brief – *The Right to Food* – while others are more lengthy – *Save and Grow, Agriculture at a Crossroads*, and *Toward the Future We Want*. Probably very few of us have the time or inclination to read all four reports. Fortunately, the staff at the Johns Hopkins Center for a Livable Future has produced excellent summaries for each of these reports, easily read and comprehended within a few hours. The summaries can help us better understand what we must do as a global family to solve the problem of hunger. The Center for a Livable Future has given the Leopold Center permission to put their reports on our website, so our readers can download and view at their leisure.

Another example that illustrates how the problem of hunger can be successfully addressed appears in an article by Francis Moore Lappe published in *Yes!* magazine. Using approaches similar to those suggested in the UN reports, the mayor of Belo Horizonte, Brazil initiated a food-as-a-right policy in 1993. Within a decade

infant malnutrition was reduced by 50 percent and infant death rates were similarly cut in half. (Lappe, 2012)

Additionally, a paper by Molly D. Anderson on how to implement food rights in the United States, based on international human rights law, provides practical scenarios for addressing the problem of hunger. (Anderson, 2012)

As important as solving the problem of hunger is, those of us interested in sustainability recognize that hunger cannot be treated as an isolated, singular issue. Wendell Berry reminded us several decades ago that one of the great faults in our culture is a tendency to design solutions which “involve a definition of a problem that is either false or so narrow as to be virtually false. To define an agricultural problem as if it were solely a problem of agriculture – or solely a problem of production or technology or economics – is simply to misunderstand the problem, either inadvertently or deliberately, either for profit or because of a prevalent fashion of thought. The whole problem must be solved, not just some handily identifiable and simplifiable aspect of it.” (Berry, 1981)

When we “solve for pattern,” as Wendell proposes, we begin to recognize that we cannot solve the problem of hunger simply by producing more food; we must also entertain the problems of poverty, inequality and the carrying-capacity of the planet, as well as the problem of the “density” of any species. Aldo Leopold told us that the “health of the land” depended on the health of the entire biotic community and for that reason nature always abhors the density of any species. Consequently, “in all species one is impressed by one common character: if one means of reduction fails, another takes over.” (Leopold, 1946)

### References:

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Read the summaries here:

[www.leopold.iastate.edu/news/leopold-letter/2012/winter/future](http://www.leopold.iastate.edu/news/leopold-letter/2012/winter/future)

# Caring for the land: Women landowners tell their stories

By MELISSA LAMBERTON, Leopold Center graduate research assistant

Imagine deeply caring for land that you own, but having little power to determine its future.

That's the situation that faces many women farmers and landowners today. Women currently own about half of the rented farmland in the United States, but many of them come from a generation and culture when they were not considered decision-makers. They sometimes lack the knowledge and confidence to make informed choices despite their deep ties to the land.

The Drake University Agricultural Law Center collaborated with Women, Food and Agriculture Network (WFAN) to capture the stories of women landowners in Iowa on film. The project is part of the Sustainable Agricultural Land Tenure (SALT) Initiative, which is funded by the Leopold Center's Policy Initiative.

"A lot of the women have a strong connection to the land," said Edward Cox, principal investigator of the SALT Initiative and a fellow at Drake University. "They've been involved with the farm operations, but they still have challenges in negotiating

farm leases and ensuring the land is used as they best see fit."

Cox partnered with Leigh Adcock, WFAN executive director, to interview women landowners. They created three videos that capture moments of determination, strength, worry and humor as women discuss their land, their families, and the difficult choices they have made.

## Farm leases

Adcock said that women landowners often don't know that they can choose a tenant and develop a lease agreement that aligns with their conservation values. Adcock interviewed Mildred Skalla, Laura Krause, Chris Henning, Martha Skillman and Charlotte Shivvers for the project, as well as tenant farmer Jerry Peckumn and ISU economist Mike Duffy.

"These women are strong," Adcock said. "They need to know the facts, and they need encouragement from other women like them who have made difficult choices in the face of family or social resentment."

One such woman is Mildred Skalla, who spoke about the painful decision to lease

her farm to someone outside the family. As land transitions from male farmers to their spouses, women like Skalla unexpectedly find themselves in the role of decision-maker, and may feel pressured to rent to a family member or neighbor even if they have differing views on how to manage the land.

"These men are not doing their wives any favors," Skalla said. "Teach them what needs to be done."

From the tenant's perspective, Peckumn said it's important for landowners to explain the balance they want to strike between conservation and profit. "Conservation on land is the responsibility of the landowner because that's a long-term investment," he said. "But the tenant has the responsibility of stewardship, implementing the plan."

## The next generation

The average age of Iowa farmers is 56, according to the U.S. Department of Agriculture. High costs of land and farm equipment remain a significant barrier to

**WOMEN** (cont. on page 7)

## Fostering leadership, preserving legacy

While women landowners in Iowa often need assistance and information from agriculture professionals, they also have much to teach and much to offer. That's the premise behind the Women, Land and Legacy<sup>SM</sup> (WLL) program, a cooperative effort led by local farm women in partnership with government agencies and nonprofit organizations. Its goal is to create strong support networks for women farmers and landowners.

"Women, Land and Legacy<sup>SM</sup> was created to give women a voice and empower them to make good decisions about their land and for their land," said Corry Bregendahl, Leopold Center assistant scientist and a member of the WLL State Team.

The program begins with "listening sessions," in which agriculture professionals meet with local women to hear about their concerns, their values and what kind of assistance they would like to help them reach their goals.

The next step is "learning sessions," structured group gatherings where women meet in small groups to talk and learn from an expert on conservation, farm leases, estate planning, business management or other topics of interest. WLL validates these gatherings as vital for community leadership, even though these gatherings typically lack the formal structure common in predominantly male-led agriculture groups.

"That's a critical question central to WLL work; how do women lead?" Bregendahl said. "We're finding that women involved in WLL have been prompted to take on more formal leadership roles, but they also lead through social roles—

through bridging connections with their families, communities and land."

WLL is one of three major programs in Iowa that does outreach to women landowners, along with Women, Food and Agriculture Network (WFAN) and Annie's Project. "I think it's fantastic that the women of Iowa can choose from several programs for women," Bregendahl said.

The program currently receives funding from USDA Rural Development. Additional support is provided by local planning teams, USDA Natural Resource Conservation Service, USDA Farm Service Agency, USDA National Agricultural Statistics Service, Iowa Department of Agriculture and Land Stewardship and the Leopold Center.

Learn more at [www.womenlandandlegacy.wordpress.com](http://www.womenlandandlegacy.wordpress.com)



**WOMEN** (continued from page 6)

beginning farmers, as well as the need to work off-farm for additional income and affordable health insurance.

The women interviewed expressed a strong desire to bring young families onto their farms and foster a conservation-minded future generation. “Young men and women, they’re going to be feeding us,” said Laura Krause, who runs a Community Supported Agriculture (CSA) operation. “They care about food, and they care about the ecosystem.”

**Caring for the land**

Cox and Adcock hope that the videos will show women landowners and beginning farmers that they are not alone, as well as inform policymakers and educators.

“They have similar issues that any landowner would face, but these women haven’t been decision-makers up until now,” Adcock said. “I’ve heard stories of women going to agencies for help and being told to come back with their husband or brother.”

That’s something that WFAN hopes to change. Through the “Women Caring for the Land” program, WFAN brings women together to meet land management professionals, learn from one another and see conservation practices on the ground.

“They have a lot of the answers themselves, and it’s just a matter of empowering them and letting them know that they are in control of their own land and legacy,” Cox said.

WFAN and Drake University have developed websites with resources for landowners, including the videos.

“To me, success would look like this: More women doing more conservation on more acres of farmland,” Adcock said.

Learn more: [www.WomenCaringfortheLand.org](http://www.WomenCaringfortheLand.org)  
[www.SustainableFarmLease.org](http://www.SustainableFarmLease.org)



Top: Leigh Adcock of the Women, Food and Agriculture Network (on right) speaks with Mildred Skalla. Bottom: Adcock and Laura Krause view the farm (photos courtesy of Edward Cox).

## Iowa food safety program builds on Leopold work

Many consumers consider locally grown food to be fresh, healthy and – possibly even more important to the farmers who grow it – safe.

Farmers with all sizes of fruit and vegetable operations are learning more about on-farm food safety practices and the documentation to ensure that what they bring to farmer’s markets and CSAs is as safe as possible. Thanks to a Leopold Center-funded project that began three years ago, farmers have a variety of options for safety training.

Iowa State University Extension and Outreach is offering a sequential series of Good Agricultural Practices (GAPs) workshops throughout the state during the 2013 growing season. Level 1 workshops provide an overview of GAPs fundamentals and optional web-based modules about basic food regulations and food microbiology. Participants in Level 2 workshops develop their own On-Farm Food Safety Plan to demonstrate how they

use and document GAPs in their operation. Level 3 workshops prepare producers for audits to become GAPs-certified, a level of food safety assurance required by some retailers and for large-scale food distribution.

“Producers are very open to the training,” said Angela Shaw, extension food safety specialist. “The top needs we’re seeing are for producer documentation and traceability, knowing where an item is going or where it came from if there happens to be a foodborne illness.”

Shaw said that new federal standards – expected soon as part of the 2010 Food Safety Modernization Act – will change how various types of produce such as melons, berries, apples and tomatoes are handled before they reach the consumer. Although the regulations will not directly affect small growers, the regulations require a plan to prevent and/or eliminate foodborne bacteria from entering the food supply. If a foodborne outbreak occurs with a particular produce item, the entire

industry will feel the negative effects, which is why these educational workshops and implementation of GAPs are so important, she added.

The Leopold Center project included development of educational materials presented to 147 producers who attended eight workshops throughout the state in 2010 and 2011. Shaw said that what educators learned has helped the team create the current workshop series.

A handful of Iowa farmers have completed all levels of training, which prepares them to become GAP-certified. Various cost-share programs are available to some growers and areas to help pay for a third-party audit.

The On-Farm Food Safety team built on the Leopold project to obtain a USDA Block Specialty grant to begin workshops in October 2012. Details are on the Iowa GAP Center blog:

<http://blogs.extension.iastate.edu/iowagap>

# Couple strives for connections in their operation

By LAURA MILLER, Newsletter editor

It's all about connections for Jan Libbey and Tim Landgraf, the newest winners of the Spencer Award for Sustainable Agriculture.

First, it was their desire to be connected to "quality habitat" that drew them to buy land next-door to East Twin Lake, a natural, glacial wetland and upland woods complex in north central Iowa. Next, a notion that they could sustain the land and it could sustain them nudged them toward farming. More recently they've invited family, farm crew members and their community into this love of the land, testimony to their belief that "sustainability is deeply seated in relationships."

Connections also have helped them with numerous challenges during the past year, including the drought. By June they were watering fruit and vegetable crops almost daily, and found a need to trust at a wholly new level.

"Our crews weathered the heat diligently all season," said Jan. "We didn't have bumper crops on anything but our CSA boxes were full every week."

They started one of the first Community Supported Agriculture (CSA) enterprises in their region in 1996. Jan became involved

in a community effort to open a small local farmers market in Belmond. By 2002, it appeared that local food production opportunities were going to continue to grow, so the couple decided to take a leap of faith. Tim left his off-farm job as an engineer, and they set about to expand the CSA and farm full-time together.

Their pace reflects the name for their operation, One Step at a Time Gardens. Their outlook is in their farm motto: "Raising healthy food...raising hope."

From their website: "Our motto comes from our vision that raising food with our crew, from this land and for our members, customers and friends opens channels for reconnection on a profound level. Sustainable life choices come in many forms. We believe food – how and where it is grown, and the eater and farmer connection – is an important first step."

They own 132 acres, of which nine acres are used to grow vegetables. They also raise about 650 chickens each summer in a pastured-poultry operation. They have converted 45 acres to permanent cover, including prairie grasses and flowers, shrubs, trees and restored wetlands. In addition to cover crops, they use composted animal manures, diverse crop rotations, shallow cultivation, mulching and grass pathways.

They admit they've been extremely busy this season, and that they've had little time to ponder the award. They sat down recently for a Skype interview, and to talk about their farm. Here are excerpts.

## What makes your operation sustainable?

**Tim:** Sustainability to us is looking at many aspects of the farm: habitat, soil use, energy use, the social connections and what impact we're having in our community. As farmers we're using resources – soil, water, energy – and we try to look at how we can give back... What are we doing to improve the

soil? How can we improve habitat?

**Jan:** Sustainability is deeply seated in relationships. We have a relationship with the farm – it gives to us and we try to give to it. It's made possible so many other relationships that make our life full.

**Tim:** I don't know if you ever become a sustainable farm. We're always learning new things, there's always more you can do. You can work at getting better at something.

## What do you enjoy about the farm?

**Tim:** We meet a lot of interesting people, which is fun. We have participated in lots of on-farm research ... One of Dr. Mark Gleason's students came two or three seasons, looking at pollinator habitat related to cucurbits (cucumbers and melons). We used to have commercial bee hives on our farm, but that person retired so we wondered what was pollinating our crops. Through this project with ISU, we've discovered the farm has a significant population of bumblebees, and squash bees, - a native bee that has evolved around the squash plant. By golly, we had both species.

**Jan:** We began hiring interns in 2003 through the 'Life in Iowa' summer student internship program offered by Iowa State (a Leopold Center project). We learn as much if not more from them as they do from us, we always look forward to the energy and enthusiasm that they bring to the farm. They are hungry for information, and our operation improves because of their questions.

## What advice do you have for a beginning farmer?

**Jan:** Pay attention to those folks who can help you achieve your goals and recognize that people are also looking your direction for that same kind of help. We wouldn't be where we are without the help of so many different folks. It's always give-and-take. We've learned from other farmers, family members, farm crews, PFI, partners, extension and many other connections.

[www.leopold.iastate.edu](http://www.leopold.iastate.edu)

Spencer Award:  
[www.leopold.iastate.edu/spencer-award](http://www.leopold.iastate.edu/spencer-award)

One Step at a Time Gardens:  
[www.ostgardens.com](http://www.ostgardens.com)

**Online Extra:** See photos and listen to Jan's farming philosophy



Tim Landgraf and Jan Libbey, Spencer Award winners



# 'Superheroes in Training': Students envision a new future for agriculture

As the Leopold Center supports new research projects about innovative practices to create healthier and more resilient farming systems, grad students often toil behind the scenes. We're putting a few of those students in the spotlight. Here you'll find excerpts from interviews with these "superheroes in training" who are working against the odds to create a better world. Look for the complete interviews on our Facebook page, [www.facebook.com/LeopoldCenter/notes](http://www.facebook.com/LeopoldCenter/notes).

## Todd Ontl, Ecology & Evolutionary Biology

### Describe your research:

I am working with the Landscape Biomass Project, a project focused on understanding the environmental outcomes of different bioenergy cropping systems across an agricultural landscape. I am studying the potential of several bioenergy crops to improve soil organic matter content from the growth of plant roots. This is important because soil organic matter is the basis for improving functioning in our landscapes, such as improving water quality and the health of our soils.



### If you could make one change to make the world more sustainable, what would it be?

If I could do one thing to make the world more sustainable it would be to

change the way many people in the United States think about and use transportation. I would like to see more incentives and options for people to use public transportation within the towns and cities where they live, and especially to use bicycles when possible. It might be a small step towards sustainability, but one that would make our communities safer and more enjoyable places to live.

### Who is your favorite superhero and why?

My high school chemistry teacher, Joel Klammer. He was an inspiration to me and many of my classmates as well. He brought a passion for both science and the environment to the classroom. He made the learning process fun and exciting, something I strive for whenever I get the chance to teach students. I think of him as a superhero because he not only was a fantastic teacher, but he was involved in many things outside of the classroom and set an example of excellence and integrity with everything he did.

## Stefan Gailans, Crop Production and Physiology and Sustainable Agriculture

### Describe your research:

In a nutshell, my research lab investigates alternative crop production and alternative cropping systems—apart from corn and soybean these systems include crops like canola, wheat, and red clover. . . . Winter varieties of canola and wheat included in the alternative systems serve as cash grain crops as well as cover crops that aim to reduce soil erosion and leaching during the "off season." . . . I got excited about this kind of research when I realized the intersection between agriculture and the environment many years ago. As one who cares for wildlife habitat, outdoor recreation, and productive agriculture, I find this intersection is very important.

### How do you like to spend your time when you're not out saving the world?

I spend a lot of time listening to music and going to see local music live with my friends. I've also recently gotten into science fiction literature, primarily the works of Isaac Asimov. I also enjoy fishing and, as per the seasons, very much enjoy hunting for waterfowl and pheasant.

### If you could make one change to make the world more sustainable, what would it be?

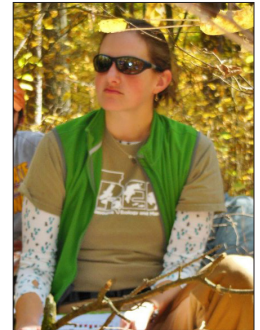
I'll draw a bit from my previous answer here. In some of his novels, Asimov portrays a world (not necessarily positively or negatively) where nearly all humans live in dense population centers with very few working the land with many machines to grow and produce food. I would much rather see the opposite of this. The more people in rural settings, the more people there are to care for agriculture and the environment.



## Anna MacDonald, Wildlife Ecology

### Describe your research:

I work on the STRIPs (Science-based Trials of Row Crops Integrated with Prairies) project, which is studying the impacts of prairie strips in crop fields, such as their ability to improve water quality and biodiversity. My role on the project is researching how birds respond to the habitat that these small prairie strips provide within agricultural fields. Grassland songbirds have experienced steeper, more widespread declines than any other group of taxa in North America, largely because of habitat loss. It's not feasible to restore large tracts of grassland habitat everywhere, but perhaps integrating small areas of habitat into agricultural lands could be beneficial for some species.



### What got you excited about studying this topic?

It's a long story, but I've always been interested in natural resources and conservation, and once I started learning about the prairie, I fell in love with it. I've been interested in birds since I learned to identify visitors to our birdfeeder while I was growing up, and even more so after taking an Ornithology course in college and having several bird-related field jobs.

### Who is your favorite superhero and why?

The first one who comes to mind...is Ding Darling. Jay N. "Ding" Darling was an award-winning editorial cartoonist, who later became the first chief of the U.S. Biological Survey. He played an important role in the early conservation movement of the United States, and his legacy lives on in his cartoons (many which are still relevant today), and the programs he helped to create. . . . Ding Darling reminds me how much one person can make a difference, and how much is still possible through hard work, communication, and partnerships.

## Videos describe research on biochar in ecosystems

By MELISSA LAMBERTON, Leopold Center graduate research assistant

As optimism grows about the benefits of applying biochar to farmland, researchers have turned their attention to a neglected topic: how biochar affects natural ecosystems.

Biochar, a carbon-rich material similar to charcoal, is created as a byproduct of burning feedstock at high temperatures in a low-oxygen environment, a process to make biofuel called pyrolysis. When applied to crop fields, biochar has many of the same benefits for soil health as fertilizer, and also sequesters carbon underground for decades or centuries.

The principal investigators of a Leopold Center project, Stan Harpole and Lori Biederman, ISU Ecology, Evolution and Organismal Biology, analyzed recent research on biochar and found that as much as 50 percent of what is applied can move from crop fields into nearby prairies, forests and waterways.

"There's been a lot of attention on biochar as this new miracle product that can solve multiple problems in terms of energy and environment," Harpole said. "But there isn't really much information about its effect on things other than crops."

To fill that knowledge gap, the researchers established 30 replicated plots in the Loess Hills treated with additions

of biochar and manure, and planted a diverse mixture of tallgrass prairie species. The experiment is featured in a new On the Ground video, "Biochar and Prairie Biodiversity," on the Leopold Center website.

Preliminary results suggest that biochar has a positive effect on plant and soil biodiversity. That could be good news for farmers, who wouldn't have to worry about biochar blowing off their fields into nearby natural areas. It also might give ecologists a useful tool for restoring prairies.

However, Biederman noted that while plants thrived with biochar additions, mycorrhizae, important soil fungi that have symbiotic relationships with plant roots, diminished. "The jury is still out," she said. The researchers will continue collecting field data for at least one more year.

Uncertainty also surrounds the effects of biochar on aquatic systems. In a basic laboratory test, Harpole discovered that biochar dissolved into water killed algae. He is now working to design a more realistic experiment that mimics how biochar moves through soil into waterways.

"The experiment is so new that it's too soon to tell what will happen," Harpole said. "Biochar has so many different ways that it can work in the environment that

## New board member understands water quality

Iowa State University's newest representative on the Leopold Center Advisory Board is a long-time faculty member whose research over the past three decades has focused on farming practices that can improve water quality.

Steve Mickelson chairs the Department of Agricultural and Biosystems Engineering and holds the title of Charles R. and Jane F. Olsen Professor of Engineering. He has studied buffer strips and their effectiveness in improving the water quality in surface runoff from row-crop fields, cattle-grazed paddocks and composting pads. He also conducts research related to the scholarship of teaching and learning, and effective classroom techniques for engaging students in learning.

He was appointed in September to serve a four-year term, replacing Senior Associate



Steve Mickelson

Dean Joe Colletti from the ISU College of Agriculture and Life Sciences.

Mickelson is no stranger to the Leopold Center. He was a member of the Animal Management Issue Team, supported by the Center from 1990 to 2002. He also worked on two research projects funded by the center, an evaluation of buffer strips in 1991, and work that was part of a larger study in 2002 evaluating phosphorus in

agricultural runoff.

"I would like to help the Center provide support to others who are conducting research that will help us to inform producers on the best ways to protect our environment while being successful business owners," he said. "I like being able to network with others who have the same goals in mind for the Center."



you're never sure which is going to be the important one."

A second video, "Biochar and Organic Tomatoes," describes a related project at TableTop Farm where ISU Environmental Sciences and Agronomy student Erich Sneller is applying biochar to Sun Gold cherry tomatoes. The experiment compares plants growing with and without biochar, either inoculated with mycorrhizae or sterilized.

Sneller envisions that farmers could supply future biofuel plants with feedstock, such as corn stover, and receive biochar in return, creating a cycle that would continually improve soil health.

"It's good for the soil and good for your wallet," Sneller said. "We're hoping we'll see some positive effects with soil fertility and increased plant growth."

The research is funded by the Leopold Center's Ecology Initiative and conducted with assistance from the ISU Western Research and Demonstration Farm and TableTop Farm.

Mickelson joined Iowa State in 1982 as a faculty member in Freshman Engineering, and joined the ABE department in 1996. He was associate chair of the department from 2005-2011, and became chair in August 2011. He also was director for the Center for Excellence in Learning and Teaching and the Co-Director of Learning Communities at ISU from 2008-2011.

He grew upon a farm north of Storm Lake in Buena Vista County. His parents still live on the farm, but the cropland is leased to neighbors.

Mickelson teaches classes in engineering design, engineering computer graphics, soil and water conservation and engineering workplace competency development. He also is the author for the sixth edition of the *Engineering Fundamentals and Problem Solving* textbook published by McGraw-Hill. His agricultural engineering degrees (1982, 1984 and 1991) are from ISU.

He and his wife, Colette, have five children and live in rural Story County.

# News & Notes

A new report explores the challenges and opportunities for farmers looking to scale-up their operations to serve wholesale markets. Prepared by Practical Farmers of Iowa, the report was funded as special project of the statewide Local Food and Farm Initiative coordinated by Craig Chase at the Leopold Center. The report summarizes interviews with 15 Iowa growers and 12 wholesale buyers. Find the *Scaling-Up* report on our Pubs & Papers page (search by title): <http://www.leopold.iastate.edu/pubs/alpha>

Iowans are asked to comment on a proposed state plan to reduce nutrient loading from farms and sewage treatment plants to improve Iowa's water quality and help shrink the dead zone in the Gulf of Mexico. The Iowa Nutrient Reduction

Strategy was developed over the past two years by the Iowa Department of Agriculture and Land Stewardship, the Iowa Department of Natural Resources and Iowa State University. Read the plan on the Web at: [www.nutrientstrategy.iastate.edu](http://www.nutrientstrategy.iastate.edu)

Leopold Center Director Mark Rasmussen and Distinguished Fellow Fred Kirschenmann were among the 138 science faculty from 27 Iowa colleges and universities who signed a 2012 Iowa Climate Statement. The document says the 2012 drought is consistent with climate change and urges state action to reduce greenhouse gas emissions, improve resilience in agriculture and move toward greater energy efficiency and increased use of renewable energy. Details are on the University of Iowa's Center for Global &

Regional Environmental Research website: <http://www.cgrer.uiowa.edu>

A readers' theatre production about the plight of Iowa farmers, written by students in an Iowa State University creative writing course, is part of a new book by ISU Distinguished Professor and Iowa Poet Laureate Mary Swander. *Farmscape: The Changing Rural Environment* (Ice Cube Press 2012) also has a number of essays related to the project. Swander used a Leopold Center grant to present the play in rural Iowa communities in 2008 and 2009.

"If you want to know what the biodiversity of the planet is going to be like in 2050, there's only one way to find out—and that's to find out what we're going to do, because it's going to be up to us." Ecologist Erle Ellis presented the 2012 Pesek Colloquium October 29 about human impact on the global landscape. A link to the podcast of his lecture is available on the Leopold Center web calendar: <http://www.leopold.iastate.edu/news/calendar/archive>

## Two people making a difference inspire conference attendees

"The food revolution is all about the ability to grow our own food. It's a revolution because we have a new generation of young people under 40 who want to get involved in the food system, and there are thousands of jobs that could be created around the food system. We need more farmers and we need those working in renewable energy, and architects and engineers and every occupation there is." – Will Allen

Will Allen, founder and CEO of Growing Power, spoke to more than 350 people who attended the 2012 Iowa Organic Conference November 19 in Iowa City. The Leopold Center was among the co-sponsors of the event. Allen's Milwaukee-based organization has expanded from year-round food production and CSAs to provide youth training programs, urban renewal projects, fish-breeding research and international outreach.

Now in its 20th year, Growing Power operates eight farms and a five-acre composting facility where 40 million pounds of food waste, including brewery and coffee

roasting materials, are turned into compost for growing fruit, vegetables, mushrooms and herbs. They also raise tilapia, perch, honey bees, goats and chickens, delivering CSA baskets to 40 locations every week in Chicago and Milwaukee. Growing Power demonstrates its growing methods through on-site workshops and hands-on demonstrations and has established satellite-training sites in Arkansas, Georgia, Kentucky, Massachusetts and Mississippi.

Fred Kirschenmann, who presented the other conference keynote said he was encouraged by Allen's comments because they offered "difficult hope – doing the right thing even if you don't know if it will all work out, because then you have the courage to go into the future."



Near right: Fred Kirschenmann;  
Far right: Will Allen (photos by  
George McGrory)



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# Highlight Events

## More details, events

Check Leopold Center Web calendar:  
[www.leopold.iastate.edu/news/calendar](http://www.leopold.iastate.edu/news/calendar)

Learn about how to get support for events: [www.leopold.iastate.edu/grants/education](http://www.leopold.iastate.edu/grants/education)

### Successful Drought Workshop

More than 65 people attended a weekend workshop in Fairfield, “Drought Proofing Your Farm,” presented by Australian permaculture expert Darren Doherty. Watch our events website for a link to a recording from the workshop introducing the principals of keyline design.

### January 11 - Spencer Award

Presentation of the Spencer Award to Tim Landgraf and Jan Libbey, CPMI Event Center, 2321 North Loop Drive, Ames. The presentation will occur during a Practical Farmers of Iowa Potluck Party. PFI conference sessions are scheduled Jan. 12 at the Scheman Building in the Iowa State Center.

### February 27 - Leopold Center Legislative Breakfast

7 - 9 a.m., Legislative Dining Room, Iowa State Capitol, Des Moines

### March 4-5 - Iowa Water Conference

Scheman Building, Iowa State Center, Ames

### March 19-20 - Iowa Local Food conference

Scheman Building, Iowa State Center, Ames

### April 7 - 2013 Shivers Memorial Lecture

7 p.m., Sun Room, ISU Memorial Union, Ames. Hans Hereen, president of the Millennium Institute, will present “Changing Course in Global Agriculture.”



Participants at the “Drought Proofing Your Farm” workshop gather around a keyline plow. Permaculture expert Darren Doherty (center, in hat) explained how keyline plowing and other practices can improve degraded soils (photo courtesy of Backyard Abundance).