ORGANIC AGRICULTURE IN WISCONSIN: 2017 STATUS REPORT

Prepared by the UW-Madison Center for Integrated Agricultural Systems and the Wisconsin Department of Agriculture, Trade and Consumer Protection

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This report is a joint effort of:

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The **Wisconsin Department of Agriculture, Trade and Consumer Protection** (DATCP) works to make Wisconsin a world leader in agriculture, food safety and consumer protection. DATCP is responsible for food safety, animal and plant health, protecting water and soil, and monitoring fair and safe business practices. The DATCP Organic Agriculture Program is housed in the Division of Agricultural Development and provides individual technical assistance and education to organic farmers and those wishing to begin farming organically, as well as to businesses processing organic products. For more information, visit datcp.wi.gov or call 608-224-5095.

The findings and policy recommendations in this resource are those of the authors and do not necessarily represent the views of the Wisconsin Department of Agriculture, Trade and Consumer Protection.

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Foreword

Thank you for your interest in the *Organic Agriculture in Wisconsin: 2017 Status Report*. This report provides details about trends, challenges and opportunities in organic agriculture. We hope that you will share our excitement for the growth potential and innovation in this sector of Wisconsin's vibrant agricultural industry.

Organic farming in Wisconsin has experienced double-digit growth since the 1990's. With 1,228 organic farms, Wisconsin is second only to California in the overall number of organic farms. In 2014, organic sales in Wisconsin amounted to $200.8 million.

As America's Dairyland, Wisconsin leads the nation in the number of organic dairy farms. Organic milk sales have grown almost 30 percent from 2008 to 2014. Besides dairy, Wisconsin also ranks first in the nation for the number of farms producing organic eggs, beef, hogs, sheep, goats, broilers and row crops. Wisconsin is second in the total number of organic vegetable and melon farms.

Wisconsin is poised for continued growth in the organic industry. Our state ranks third in the nation for the number of farms and acres transitioning to organic production. Wisconsin is second nationally for the number of organic farms that are adding organic acres. Expanding organic acres is critically important for ensuring a consistent, stable supply of organic products in the market.

Food processing is a central part of the organic supply chain, moving products from the farms to retail outlets to consumers. For many organic farmers and business in Wisconsin, processing can be a bottleneck in this chain. There is currently a shortage of certified organic meat and poultry processing facilities in Wisconsin, creating an opportunity for businesses in Wisconsin. While vegetable canning companies in Wisconsin are developing organic product lines, it remains challenging for small and mid-size vegetable growers to find certified organic processing facilities.

Many dairy processing plants across the state have obtained organic certification, which allows them to participate in the rapidly growing market for organic milk and support Wisconsin's leadership in dairy. Investments in on-farm organic grain storage and cleaning enable organic grain farmers to get a higher price by selling year-round.

We appreciate the work of the Wisconsin Organic Advisory Council for their sustained leadership and support of this agricultural sector. We are grateful to Wisconsin's organic farmers, processors and businesses for their commitment to the industry. We hope you find this organic status report educational and beneficial.

Sincerely,

Ben Brancel
Secretary
Wisconsin Department of Agriculture,
Trade and Consumer Protection

Kathryn VandenBosch
Dean and Director
College of Agricultural and Life Sciences
University of Wisconsin-Madison

Statement by the Wisconsin Organic Advisory Council

Organic agriculture is a tremendous opportunity for farms and other businesses across the agricultural landscape, with U.S. organic product sales achieving a record $43.3 billion in 2015. Wisconsin is at the forefront of organic agricultural activity with the second most organic farms in the United States. Organic farmers in Wisconsin have seized the opportunity to embrace an economically attractive production system that places environmental, animal and human health as a high priority. Consumer demand for organic foods continues its decades-long, double-digit growth, with organic produce and dairy representing nearly half of organic sales. Businesses serving agriculture, such as veterinarians, feed mills, trucking companies and food processors, have also found sustainable economic growth in the organic sector.

Wisconsin's leadership in organic agriculture presents an opportunity for food processors—of all types and sizes—to transform raw organic commodities into value-added products. Many Wisconsin processors, from cheese factories to grain mills to canned vegetables, have dedicated some or all of their activities to certified organic production. However, a shortage of facilities that can prepare organic commodities for market limits opportunity in our state.

The greatest need is for mid-scale organic food processing. Poultry provides one example of how processing limits opportunities for organic family farms. A producer who wishes to raise fewer than one thousand organic broilers can either prepare these for market on-farm or take the birds to a one of a few small-scale custom processing operations. However, a producer who wishes to raise five or ten thousand birds in a season faces extremely limited processing options within our state's borders. Wisconsin's infrastructure for processing vegetables on a large scale is healthy and productive. However, there are few options for Wisconsin's organic, mid-scale vegetable and fruit growers to process their products and increase their offerings beyond fresh market sales, unlike other states. Community incubator kitchens have helped many Wisconsin businesses get started in their own value-added processing, but not everyone has the inclination, skills or time to be a grower, processor and marketer. Wisconsin has a nascent food grade grain movement, with millers and bakers expanding the production and consumption of Wisconsin-grown, organic baked goods. The market demand for both food- and feed-grade organic grain is tremendous.

The first step to meeting the need for organic processing in Wisconsin is recognizing both the opportunities and challenges. We know consumers want to purchase organic food, both fresh and processed. We know there is a need for organic livestock feed, both for single commodities and blended rations. We know that Wisconsin's organic farmers produce high-quality food and fiber, and can benefit from expanded market possibilities. Our challenge is to grow the infrastructure in a way that enhances opportunities for all agricultural producers, processors and consumers. By providing more robust market options, Wisconsin will set the stage for resilient and steady growth, helping both organic and non-organic businesses.

The Wisconsin Organic Advisory Council is a standing committee under the Wisconsin Agricultural Board. Our mission includes bringing together public and private resources to promote organic agriculture in our state. We are strategizing ways to meet challenges with organic processing from a wide variety of angles, including enhanced educational, financial, regulatory and market opportunities. The Wisconsin Organic Advisory Council's quarterly meetings are open to the public, and we encourage you to contact us with your comments, suggestions and concerns.

Organically yours,

Harriet Behar
Midwest Organic and Sustainable Education Service
Organic Advisory Council

Executive summary

Wisconsin is a national leader in organic agriculture. Wisconsin excels in both the number of farms involved in organic agriculture and the breadth of organic products raised and sold.

According to data from the USDA National Organic Program (NOP), Wisconsin had 1,334 organic farms in 2015, nearly doubling over the last 10 years.

This puts our state in a good position to participate in the growing market for organic food, both in the U.S. and across the globe. The global organic food market is projected to experience a compound annual growth rate of over 14 percent from 2016 to 2021. The U.S experienced record high organic sales of $43.3 billion in 2015, up 11 percent from the previous year's record.

The 2014 Organic Survey conducted by the USDA National Agricultural Statistics Service provides a wealth of data about the organic sector nationally, as well as in Wisconsin. This survey shows that Wisconsin remains the second state in the nation in total number of organic farms, second only to California. Wisconsin ranks third behind California and Montana in the number of organic acres, and experienced a 16.9 percent increase in organic acreage from 2008 to 2014. This growth is counter to national trends, with organic acreage in the U.S. as a whole decreasing 10 percent from 2008 to 2014.

Wisconsin ranked fifth in dollar value of organic sales in 2014. The value of organic commodity sales from Wisconsin farms increased 51.2 percent from 2008 to 2014, totaling $200.8 million. U.S. organic commodity sales increased 72.4 percent in that same time period.

Wisconsin is the top state for the number of organic dairy farms, with 429 organic dairies. Wisconsin organic milk sales increased 29.8 percent from 2008 to 2014, going from $85.1 million to $110.5 million and comprising 55 percent of total organic sales for the state in 2014.

Wisconsin also has a strong livestock and poultry sector with 121 organic egg producing farms, the most of any state in the nation. Wisconsin also ranks first in the number of farms producing organic beef, hogs, sheep, goats and broilers.

Wisconsin ranks second in the number of organic vegetable and melon farms, rising from its third place spot in 2008. The sales value of field-grown vegetable and melons in Wisconsin was $17.4 million in 2014. Wisconsin ranks first in the number of farms producing field-grown beans for processing, dry onions and sweet corn. Wisconsin ranks second for the number of farms growing organic cranberries, third for organic raspberry farms and fifth for organic strawberry farms.

With 909 farms and sales valued at $25.7 million in 2014, Wisconsin ranks first in the nation for the number of farms growing organic field crops.

Wisconsin ranks third in the nation for the number of non-organic farms with transitioning land, which is a key indicator of the potential for growth in a state's organic sector.

Despite these encouraging production and sales figures, organic processing is a bottleneck for

growth in this industry, particularly for small-and mid-scale farms and businesses. While organic dairy processing in the state is generally well established, processing in other sectors, including grain, livestock and vegetables, hasn't kept pace with production.

On-farm storage and cleaning infrastructure allow farmers to reap higher prices for their organic grain. By investing in on-farm storage, farmers are often able to receive a higher pay price for their crop later that year or into the next, when storage facilities and feed mills need organic grain and will pay more for it. For food-grade organic grain, many mills in the Upper Midwest don't have grain cleaning equipment and won't buy dirty grain. Investment in cost-sharing programs to build on-farm organic grain storage would allow more organic grain to reach the market, build market share for organics throughout the year, and increase income for farmers.

While Wisconsin ranks first in the nation for the number of farms raising organic livestock and poultry, the availability of certified organic processing poses a hurdle for these businesses. Currently, there are fewer than ten meat slaughter and processing facilities in Wisconsin that are certified organic. Like farmers, many processing plant owners are reaching retirement age, which leads to high turnover across this industry. Organic livestock producers must process their products at USDA-inspected, certified organic plants if they wish to sell their products across state lines, which further limits their options. Growing demand for organic meat could translate into higher profits in the processing business, and more processors seeking organic certification.

Organic vegetable processing faces unique challenges at different scales. Larger vegetable processors in Wisconsin are looking to grow their organic product lines, as the organic market is growing much faster than the conventional market for canned and frozen vegetables. Year-to-year variation in quality and yield constrains growth in organic vegetable processing, and large retailers like Wal-Mart drive prices, keeping profit margins low. Nonetheless, vegetable canners want to be part of the growing organic market.

Smaller scale organic fruit and vegetable farms can boost their profits and make use of blemished produce with value-added processing, if they have access to licensed processing facilities. There is a great need for facilities that serve as food hubs, providing capacity for aggregating product from growers and processing it in certified, shared space. Distribution is also a bottleneck for smaller scale growers producing value-added, processed products, as retail customers rarely purchase their products in enough volume to cover transportation costs.

While the lack of meat and vegetable processing can pose a barrier for organic growers in Wisconsin, this is not the case for organic dairy. Dairy plants across the state have secured organic certification in order to process milk on a contract basis from Organic Valley, an independent cooperative of organic farmers based in La Farge. Most of their organic dairy product line is processed through contracts with over 100 plants across the United States.

Organic Valley is an example of how a small, local cooperative grew into a preeminent national label. Wisconsin's agricultural industry would benefit from more support for small organic businesses, particularly in overcoming processing barriers to growth.

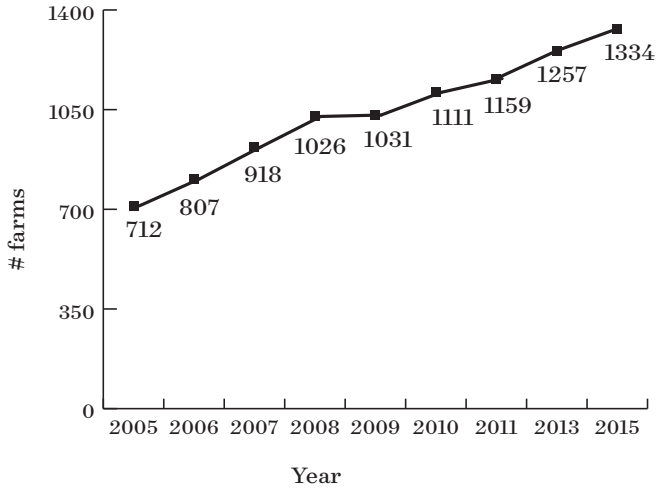
Organic agriculture in Wisconsin by the numbers

Data about organic farms

Wisconsin is a national leader in organic agriculture. The USDA National Organic Program (NOP), the federal agency that administers organic regulations, also collects data on organic farms throughout the U.S. According to NOP data, Wisconsin had 1,334 organic farms in 2015, an increase since 2013 (Figure 1). Figures 2 and 3 on the next two pages show the distribution of organic farms and processors throughout the state, as reported by the NOP.

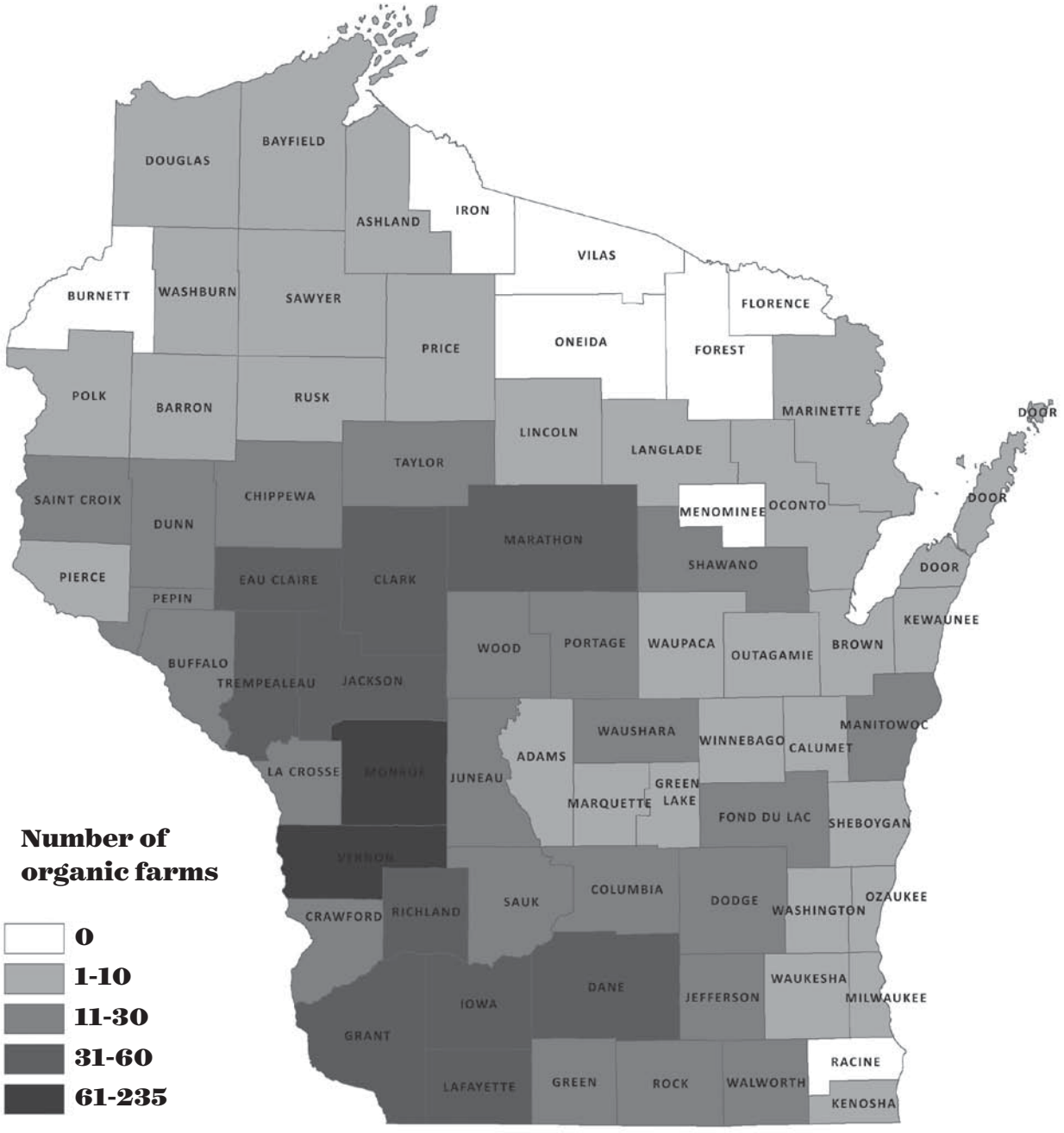
These maps show that while certified organic farms are concentrated in the southwest part of the state, they are in nearly every county. Processors are also distributed throughout the state, with the lowest number of processors in the far northeast part of Wisconsin.

Figure 1. Number of organic farms in Wisconsin since 2005 according to NOP data



Source: USDA National Organic Program (NOP) data.

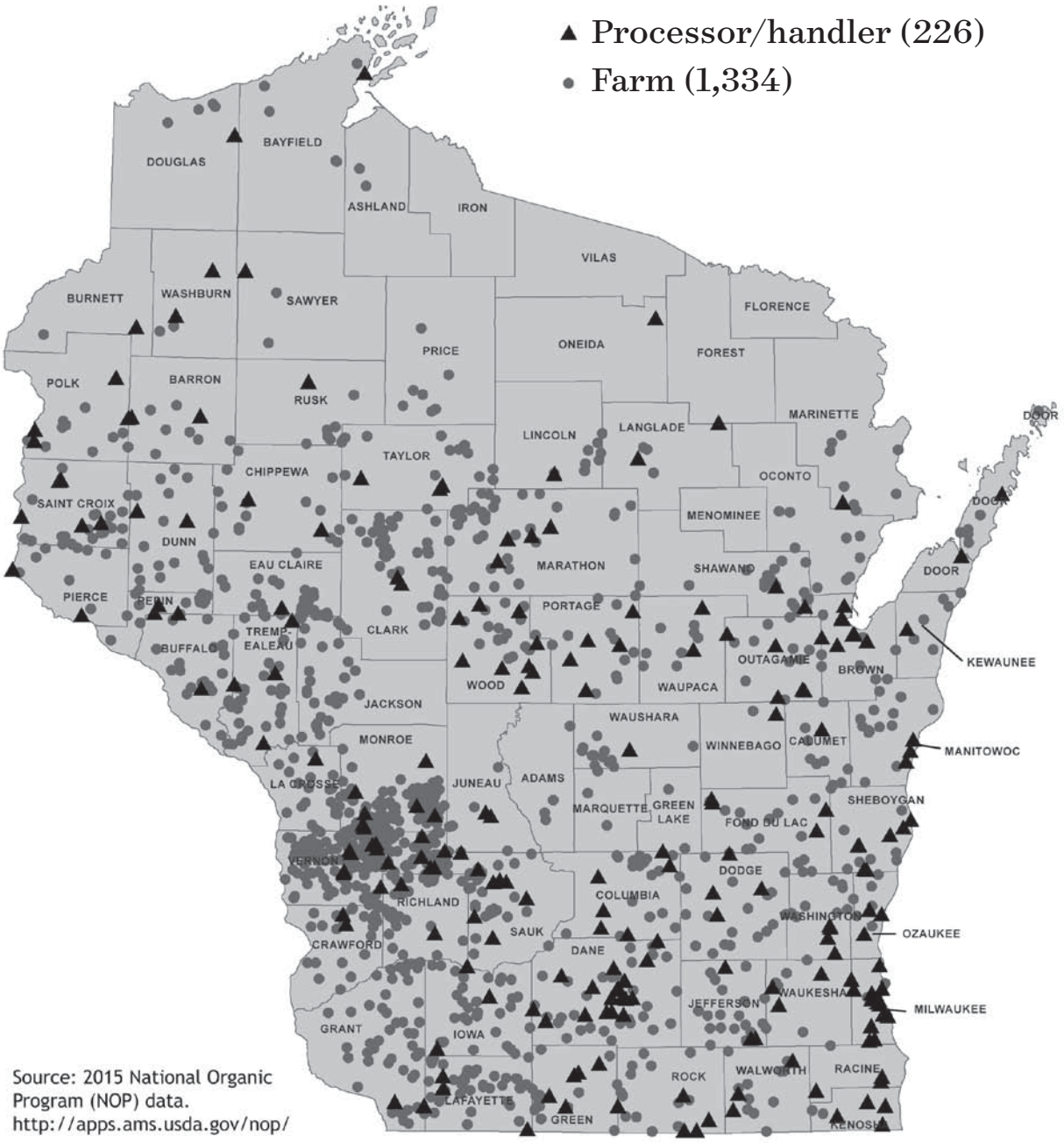
Figure 2. Distribution of certified organic farms in Wisconsin, 2015



Source: 2015 National Organic Program (NOP) data. http://apps.ams.usda.gov/nop/

Prepared by the Wisconsin Department of Agriculture, Trade and Consumer Protection, Dec. 2016

Figure 3. Wisconsin certified organic farms and processors/handlers, 2015



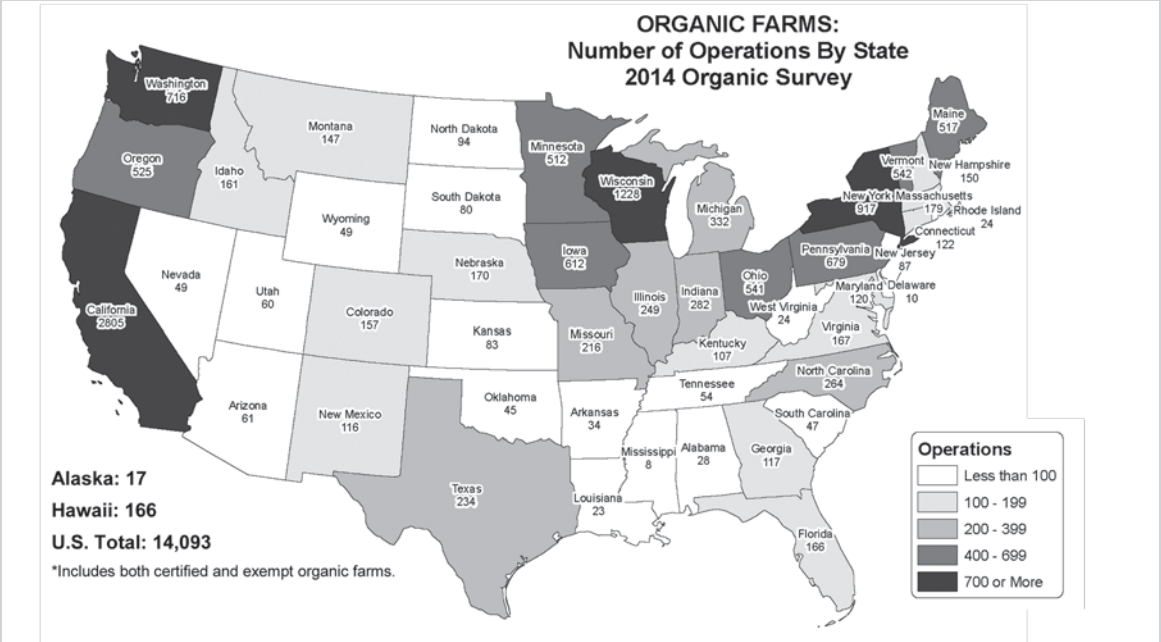
Prepared by the Wisconsin Department of Agriculture, Trade and Consumer Protection, Dec. 2016

The 2014 Organic Survey conducted by the USDA National Agricultural Statistics Service (NASS) provides a wealth of data about the organic sector nationally and by state. It provides a detailed picture of certified organic farms and sales from these farms, as well as farms growing organically but grossing less than $5,000 annually from organic sales, and therefore exempt from certification. The graphs and discussion below refer to certified and exempt farms unless noted otherwise. NASS mailed the organic survey forms to approximately 17,000 producers nationwide, all known certified and exempt operations as shown by prior surveys and information on new organic operations. The survey asked about organic farming and ranching activities during 2014, including production by crop, production and marketing practices, and challenges and plans for the future.

There are several reasons why the NOP data on page 1 shows different farm numbers than the 2014 Organic Survey. NOP data does not include exempt farms, but the 2014 Organic Survey does. Also, the Organic Survey uses data that is self-reported. The response rate to the 2014 Organic Survey was 63 percent, and the results include statistical adjustments for nonresponse, misclassification, and coverage. The number of certified organic producers reported by the NOP is gathered as part of a mandatory reporting requirement.

Figure 4. Number of organic farms by state, 2014

Source: USDA. 2014 Organic Survey Wisconsin. https://www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/WI_Organic_Release.pdf

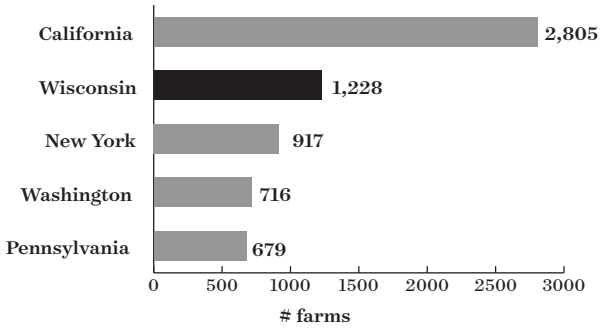


Many of the statistics gathered in the 2014 Organic Survey are comparable to those collected in the 2008 Organic Production Survey, thus allowing for a comparison over a six-year time frame. Both surveys collected information from certified and exempt organic farms, and asked similar questions. Dollar value comparisons in the data have not been adjusted for inflation.

The 2014 Organic Survey shows Wisconsin's continued strength in organic agriculture. Wisconsin excels in both the numbers of farms involved in organic agriculture (Figure 4) and the breadth of organic products raised and sold. Wisconsin remains the second state in the nation in total number of organic farms with 1,228 farms, second only to California with 2,805 farms (Figure 5). Wisconsin ranks third behind California and Montana in the number of organic acres, with 228,605 organic acres (Figure 6), representing a 16.9 percent increase in acreage from 2008 to 2014. This growth in Wisconsin organic acreage is counter to national trends, with organic acreage in the U.S. as a whole decreasing 10 percent from 2008 to 2014, from 4.1 million to 3.7 million acres.

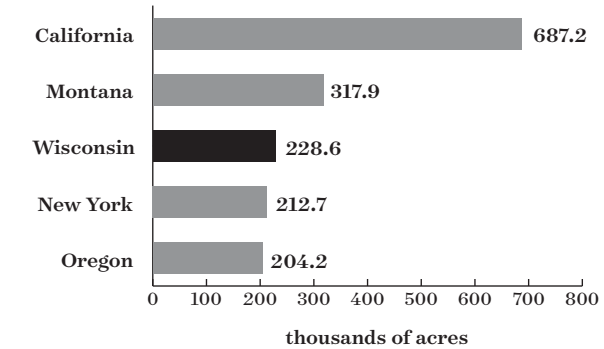
Wisconsin ranked fifth in dollar value of organic sales (Figure 7). The value of organic commodity sales from Wisconsin farms increased 51.2 percent from 2008 to 2014, expanding from $132.8 million to $200.8 million. U.S. organic commodity sales increased 72.4 percent in that same

Figure 5. Top five states in number of organic farms according to the USDA 2014 Organic Survey



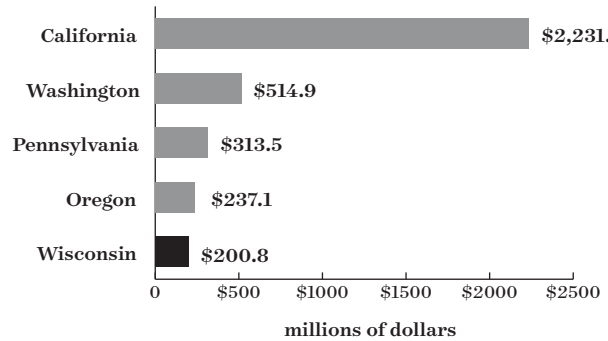
Source: USDA. 2014 Organic Survey, Table 1.

Figure 6. Top five states in number of organic acres, 2014



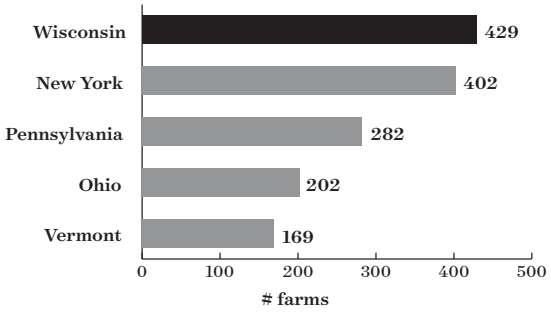
Source: USDA. 2014 Organic Survey, Table 1.

Figure 7. Top five states in dollar value of organic sales, 2014



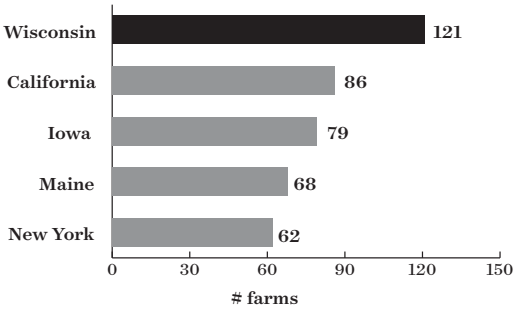
Source: USDA. 2014 Organic Survey, Table 1.

Figure 8. Top five states in number of organic dairy farms, 2014



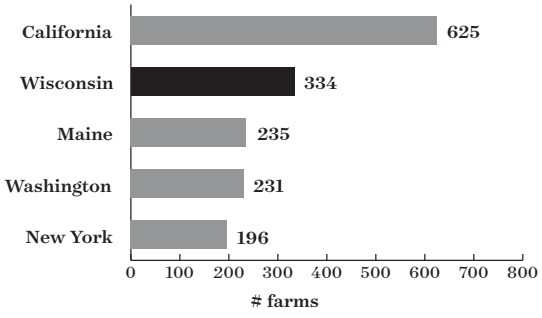
Source: USDA. 2014 Organic Survey, Table 16.

Figure 9. Top five states in number of organic egg farms, 2014



Source: USDA. 2014 Organic Survey, Table 16.

Figure 10. Top five states in number of farms growing organic vegetables and melons in the open, 2014



Source: USDA. 2014 Organic Survey, Table 5.

time period, moving from $3.2 billion to $5.5 billion. In 2014, the portion of organic farms in Wisconsin for whom 100 percent of their sales were from organic products was 50.6 percent, compared to 59.3 percent for the U.S. as a whole. This indicates that a subset of farms were operating as parallel operations, certifying a portion of their acres and selling both organic and conventional products.

Wisconsin is the top state for the number of organic dairy farms, with 429 organic dairies (Figure 8). Wisconsin organic milk sales increased 29.8 percent from 2008 to 2014, going from $85.1 million to $110.5 million and comprising 55 percent of total organic sales for the state in 2014. Sales of organic dairy cows, beef cows and all other cattle and calves in Wisconsin totaled $19.7 million and 9.8 percent of total statewide organic sales in 2014. This is an increase of 128 percent from 2008, when cattle sales came to $8.6 million.

Wisconsin also has a strong livestock and poultry sector with 121 organic egg-producing farms, the most of any state in the nation (Figure 9). The value of Wisconsin organic egg sales increased 121.6 percent from 2008 to 2014, going from $7.5 million to $16.6 million. The number of egg laying hens in Wisconsin increased 85.1 percent from 2008 to 2014, going from 194,341 to 359,815 layers. Wisconsin also ranks first in the number of farms producing organic beef, hogs, sheep, goats and broilers.

The USDA 2014 Organic Survey shows that Wisconsin ranks second in the number of organic vegetable and melon farms with crops grown in the open (Figure 10). The sales value of field-grown vegetable and melons in Wisconsin was $17.4 million in 2014. Wisconsin ranks first in the number of farms producing field-grown beans for processing, dry onions and sweet corn. Wisconsin has 59 farms growing vegetables and melons under high tunnels or greenhouses, with 2014 sales valued at $629,543.

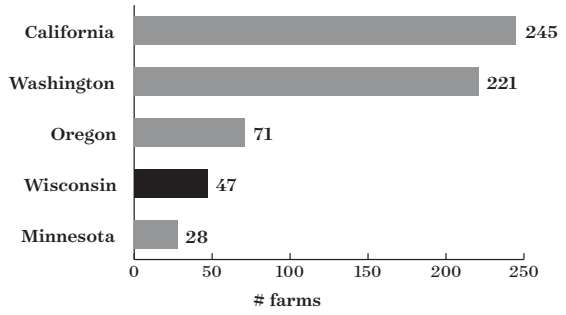
Wisconsin ranked fourth for the number of organic apple farms in 2014, with 47 farms (Figure 11). The value of Wisconsin organic apple sales doubled from 2008 to 2014, from $92,767 to $189,018.

Wisconsin ties for seventh place in the nation for the number of farms raising organic fruit, tree nuts and berries, not including apples or grapes (Figure 12). The value of sales from these crops was $3.3 million in 2014.

Wisconsin ranks second for the number of farms growing organic cranberries, third for organic raspberry farms and fifth for organic strawberry farms. The value of Wisconsin's organic sales of blueberries increased 179 percent from 2008 to 2014, and sales of organic strawberries increased 42.8 percent.

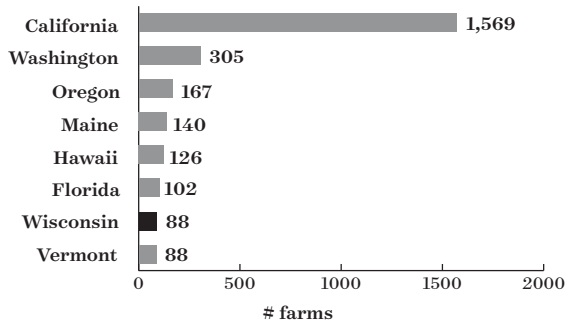
With 909 farms and sales valued at $25.7 million in 2014 (Figure 13), Wisconsin ranks first in the nation for the number of farms growing organic

Figure 11. Top five states in number of organic apple farms, 2014



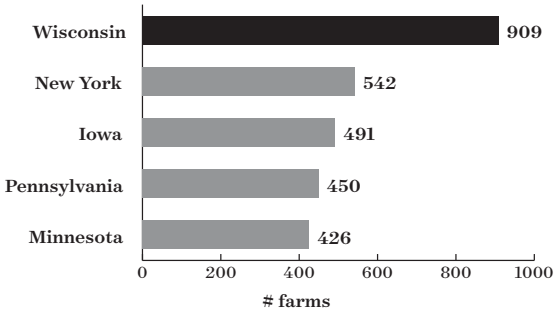
Source: USDA. 2014 Organic Survey, Table 8.

Figure 12. Top eight states in number of organic fruit farms (excluding apples and grapes), 2014



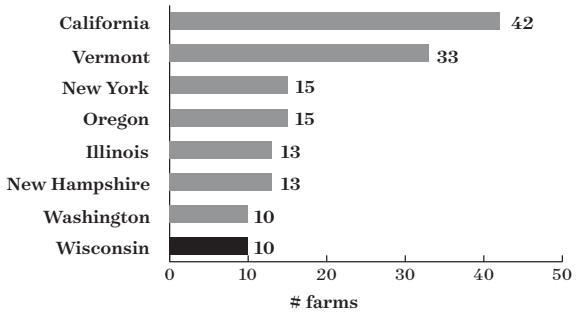
Source: USDA. 2014 Organic Survey, Table 7.

Figure 13. Top five states in number of organic field crop farms, 2014



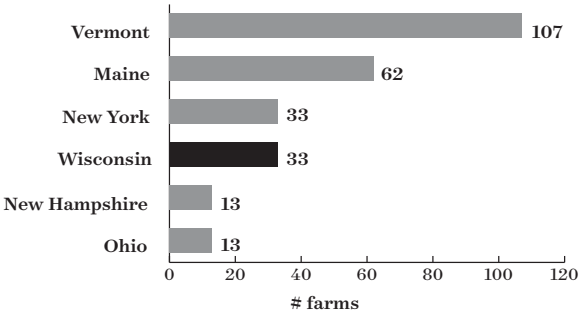
Source: USDA. 2014 Organic Survey, Table 12.

Figure 14. Top eight states in number of organic floriculture and bedding plant farms, 2014



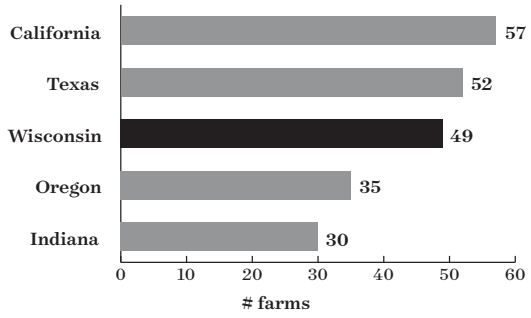
Source: USDA. 2014 Organic Survey, Table 13.

Figure 15. Top six states in number of organic maple syrup farms, 2014



Source: USDA. 2014 Organic Survey, Table 15.

Figure 16. Top five states in number of non-organic farms with transitioning acreage, 2014



Source: USDA. 2014 Organic Survey, Table 81.

field crops. Sales of corn for grain or seed totaled $9.4 million, or 36 percent of total organic field crop sales in the state. Dry hay sales were $8.1 million, or 31 percent of the total.

Wisconsin ranks first for the number of farms growing corn, oats, rye and barley for grain or seed, sunflower seed, dry hay, wheat, corn and sorghum for silage or greenchop, and haylage, other silage and greenchop.

Wisconsin is in the top eight states in the number of organic floriculture and bedding plant farms (Figure 14).

Wisconsin is tied with New York for third place in the number of organic maple syrup farms (Figure 15). The value of Wisconsin organic maple syrup sales tripled from 2008 to 2014, growing from $99,022 to $298,659.

The number of farms and acres transitioning to organic production is a key indicator of the potential for growth in a state's organic sector. Wisconsin ranks third in the nation for the number of non-organic farms with transitioning land (Figure 16), with 2,391 acres in transition on these farms as of the end of 2014.

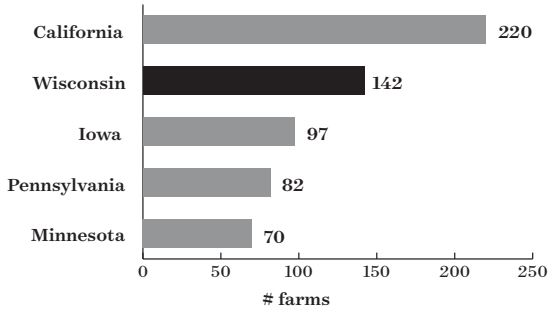
Wisconsin ranks second for the number of certified and exempt organic farms adding organic acres by transitioning land to organic production, with 142 farms (Figure

17) and 10,467 transitioning acres on these farms.

Wisconsin has a lower percentage of sales made directly to retail outlets or institutions than the nation as a whole, and similar percentages of sales going directly to consumers. Compared to the U.S. as a whole, Wisconsin has a higher portion of sales to wholesale markets (Figure 18). The number of certified or exempt organic farms in Wisconsin selling through Community Supported Agriculture (CSA) increased 49 percent from 2008 to 2014, going from 57 to 85 farms.

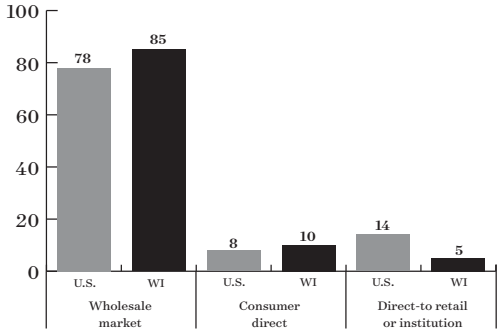
More than half of organic product sales (58 percent) in Wisconsin occur locally. However, 31 percent occur regionally and 11 percent occur nationally (Figure 19). Compared to the country as a whole, in 2014 Wisconsin had more farms with a local first point of sale and fewer farms with a national or international first point of sale (Figure 20 on the next page).

Figure 17. Top five states in number of certified and exempt farms with transitioning acreage, 2014



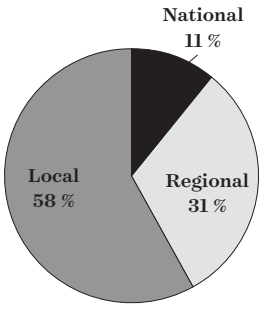
Source: USDA. 2014 Organic Survey, Table 82.

Figure 18. Percent of organic sales at specified outlets, U.S. and Wisconsin, 2014



Source: USDA. 2014 Organic Survey, Table 22.

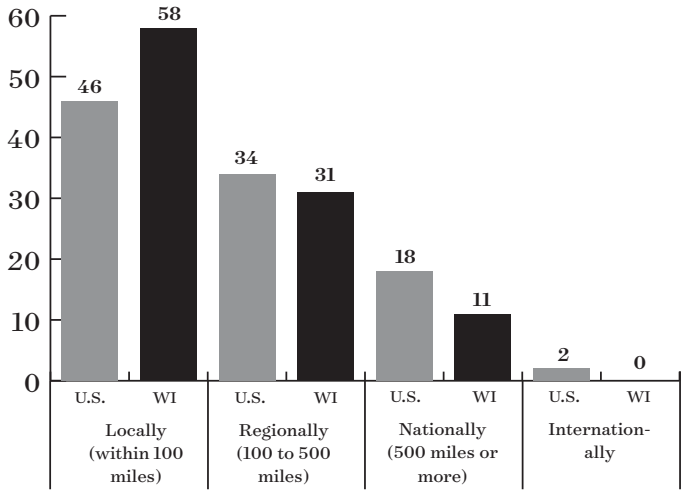
Figure 19. First point of sales, percent of Wisconsin organic sales, 2014



Source: USDA. 2014 Organic Survey, Table 22.

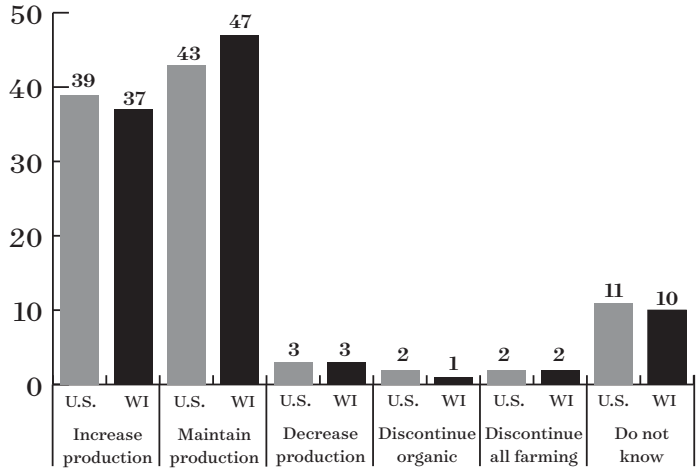
Organic farmers in Wisconsin have five-year production plans similar to those of farmers across the U.S. (Figure 21), with slightly fewer Wisconsin farmers planning to increase production and slightly more maintaining the same level of production.

Figure 20. Percent of organic sales, U.S. and Wisconsin, with specified location of first point of sales, 2014



Source: USDA. 2014 Organic Survey, Table 22.

Figure 21. Percent of organic farms, U.S. and Wisconsin, with selected five-year production plans, 2014

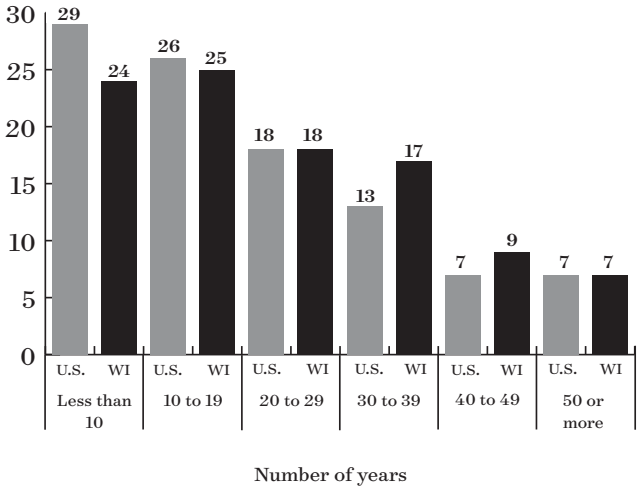


Source: USDA. 2014 Organic Survey, Table 26.

Compared to the nation as a whole, in 2014 Wisconsin had a lower percentage of farmers with fewer than 20 years of farming experience, and more farmers with 30 to 50 years of experience (Figure 22).

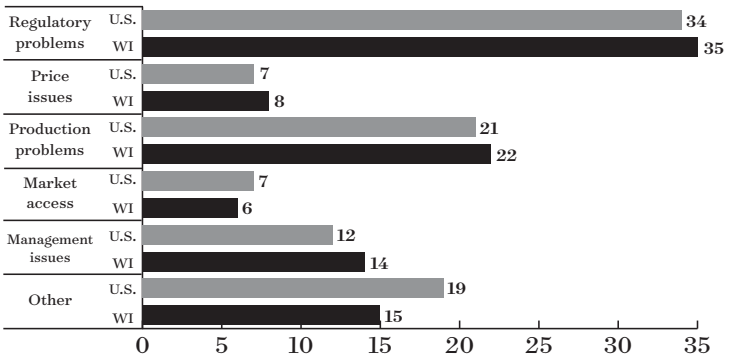
Wisconsin farmers identified similar primary production challenges as farmers across the U.S. (Figure 23). Regulatory problems were cited as the primary challenge by most organic farmers nationally and in Wisconsin.

Figure 22. Percent of total organic farms by number of years involved in agricultural production, U.S. and Wisconsin, 2014



Source: USDA. 2014 Organic Survey, Table 25.

Figure 23. Percent of total organic farms identifying specified primary production challenge, U.S. and Wisconsin, 2014



Source: USDA. 2014 Organic Survey, Table 24.

Market Trends

The organic market, both in the U.S. and across the globe, continues to expand. The global organic food market is projected to experience a compound annual growth rate of over 14 percent from 2016 to 2021.[1] The U.S experienced record high organic sales of $43.3 billion in 2015, up 11 percent from the previous year's record. Organic options are more available than ever before. With supermarkets, big box stores, membership warehouse clubs, and other outlets continuing to expand their organic offerings, greater access to these products is, in part, fueling increased consumer demand for organic products.[2]

Organic cost share in Wisconsin

The 2002 Federal Farm Bill provided funding for a cost-share program that helps organic farmers and processors pay for their organic certification. Funding comes from the federal government, through the USDA National Organic Program. The program is administered through the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) (see datcp.wi.gov/Pages/Organic-Certification-Cost-Share-Program.aspx).

In 2015, DATCP reimbursed 940 organic certified operations for $802,372 for a 58 percent participation rate in the program. This was a significant increase from 2014 where DATCP reimbursed 682 people in the amount of $589,233. While the average amount of reimbursement per operation stayed the same, the number of participants increased by 28 percent. DATCP has had excellent support from staff at certifying agencies to both encourage participation and to assist in providing client information used to process the applications. This cooperation is invaluable and DATCP would not have had this degree of participation without their help. Probably the main reason for the increase in participation is that the USDA changed the program rules and allowed DATCP to extend the application deadline from December into the next calendar year so people were encouraged to apply through the month of March. Wisconsin had an almost a 20 percent greater participation rate in the cost share program than California.

For 2016, DATCP has already processed over 850 applications and plans to continue accepting applications through March or until the funds are gone.

Demand for organic is not limited to isolated regions of the U.S. or particular consumer groups. However, according to an Organic Trade Association survey, Millennials are the main group of organic consumers in the nation. About a third of U.S. families "make a great deal of effort" to choose organic foods and products, with nearly three-quarters making at least a minor effort. Additionally, one-third of parents list purchasing organic products as one of their top three priorities when buying food.[3]

With this pronounced, ongoing market growth, organic farmers are challenged to meet the increasing call for their products. In particular, growing demand for organic grain presents an opportunity for farmers wanting to enter this market, with the

[1]TechSci Research. 2016. Global Organic Food Market By Product Type, By Region, Competition Forecast and Opportunities, 2011 – 2021. https://www.techsciresearch.com/report/global-organic-food-market-by-product-type-organic-meat-poultry-and-dairy-organic-fruits-and-vegetables-organic-processed-food-etc-by-region-europe-north-america-asia-pacific-etc-competition-forecast-and-opportunities/833.html, accessed 12/6/16.
[2]Organic Trade Association. 2016 Organic Industry Survey. https://www.ota.com/news/press-releases/19031, accessed 12/6/16.
[3]Organic Trade Association. 2016 U.S. Families' Organic Attitudes and Beliefs Study.

Background: Organic certification

"Organic" is a label that describes how an agricultural product is grown and handled before leaving the farm or processing facility. Farmers who grow plants and raise animals, as well as processors who create value-added products, may apply for organic certification under the United States Department of Agriculture's (USDA) National Organic Program (NOP). The organic standards overseen by this agency, effective since 2002, address production, processing, labeling, certification, recordkeeping and inputs allowed in organic farming and processing. Additional oversight is provided by the National Organic Standards Board (NOSB). This federal advisory board, made up of 15 public appointees from across the organic community, considers and makes recommendations on a wide range of issues involving the production, handling and processing of organic products.

The USDA organic regulations not only specify what materials farmers and processors can use during the production of organic goods, but also adherence to certain production practices. To be eligible for organic certification, prohibited materials must not be applied to land for 36 months prior to planting an organic crop. Soil-enhancing practices, such as management to reduce erosion and improve soil quality, must be demonstrated and documented by organic farmers. With respect to inputs, most synthetic herbicides and pesticides are prohibited and natural products allowed, with certain exceptions within both categories, as outlined by the National List of Allowed and Prohibited Substances. Strict manure and compost guidelines, as well as a prohibition of the use of sewage sludge, align with sound food safety practices. Weed, insect and disease management practices focus on non-chemical controls such as crop rotation, variety selection, biological control, mulching and tillage. The use of genetically modified plant varieties and products are prohibited under the USDA organic regulations.

Certified organic livestock must be fed organic feed and/or pasture. They cannot be treated with growth hormones or antibiotics, or fed urea, manure, or animal by-products. Organic livestock producers are required to provide their animals with species-appropriate access to the outdoors and the opportunity to practice natural behaviors. Ruminants must receive a minimum 30 percent dry matter intake from pasture during the grazing season. Practices such as dehorning and castration must be performed with animal welfare in mind, with minimal pain and stress. While the administration of antibiotics results in automatic decertification of the animal, other medications can be used, and withholding medical treatment from a sick animal to protect its organic certification is not allowed.

premium prices that organic products fetch. The organic industry recognizes that, in order to maintain market strength and meet consumer demand, it must be able to ensure a strong, stable supply of organic product. As a result, the creation of a secure supply chain from farmers to processors is essential. This includes maintaining and expanding domestic organic acreage, developing programs to help farmers transition to organic, and encouraging new growers to farm organically.

Organic processing in Wisconsin: Opportunities and challenges

Although Wisconsin continues to be among the leaders across the nation in organic farms, acres, production and sales, organic processing is a potential bottleneck for continued growth in this industry. This is particularly true for small-and mid-scale farms and businesses. While organic dairy processing in the state is generally well established, organic crop and livestock processing hasn't kept up with production. Many organic farms in the state that sell meat, vegetables and other products directly to consumers would like to make the leap to selling wholesale and retail. But this can be challenging due to a scarcity of certified processing plants. The following section illustrates some of the processing bottlenecks faced by grain, livestock and vegetable producers, and illustrates the processing partnerships that have helped make Wisconsin the organic dairy state.

Organic grain processing

When it comes to growing organic grains, there are plenty of challenges. Managing weeds, providing sufficient fertility, and controlling pests—all without chemicals—can be a daunting task. Even after weathering a long season and finally getting the crop out of the field, deciding what to do with the harvest might not be easy either. While fruits and vegetables can be sold at the farm gate the same day they're picked, grains, whether for feed or human food, almost always require some sort of storage phase and final processing.

It's often a "which comes first—chicken or egg" situation: Before committing to grow organically, farmers need to know that there is a processor who can handle their harvest and get it to a customer. However, a processor can only increase capacity and find customers if they have sufficient supply from farmers. Therefore, acres under organic production and processing capacity often grow slowly and in tandem. So, where are the current bottlenecks? And where are the wisest investments to be made once the crop leaves the field?

On-farm storage

Ernie Peterson and Craig Shoemaker are both veterans of the organic livestock feed industry. Peterson's Cashton Farm Supply (CFS Specialties) and Super Soy provide a whopping 1.4 million bushels of organic grain storage in the western part of the state while Shoemaker's S&S Custom Roasting has just 10,000 bushels of organic grain storage available in eastern Wisconsin. Although they operate at vastly different scales, they both provide the processing facilities necessary to support local organic grain growers with a market and organic livestock producers with a feed product. They also both have the same advice for growers: invest in on-farm storage.

"Most folks don't have their own storage," Shoemaker explains. "They might just have a couple gravity boxes, meaning that they have to sell in the fall and take whatever price they get." Peterson puts it more bluntly: "Most people leave way too much money on the table." By investing in on-farm storage, farmers are often able to receive a higher pay price for their crop later that year or into the next, when storage facilities and feed mills like CFS and S&S need the grain. Peterson goes on to explain that, "If you store your grain with me, it is difficult, if not impossible, to market it as identity preserved grain."

By having his or her own storage, however, a farmer can retain the value of differentiated, identity preserved (IP) grain, whether it's organic, non-GMO, a specific variety, seed stock, or higher quality than the bulk bin. "Don't build a 10,000 bushel bin, build a few two- or three thousand bushel bins," Peterson advises. The ability to store smaller amounts of higher value grain allows farmers to capture a premium, which is not possible with bulk storage.

Deciding whether or not to invest in on-farm storage or grain cleaning infrastructure can be tough. A first step is to consider storing grain with a certified grain warehouse, like Cashton Farm Supply. For $0.10/bushel and $0.03/month, Peterson will store organic grain in a commingled bin. He also estimates that it could take $2.00/bushel or more to build a bin on-farm, with smaller bushel bins costing more. Buying a used bin is also an option. Any of these approaches need to pencil out over the long term. However, whether at a certified warehouse or on-farm, investing in the ability to hold grain until later in the year is worth it in most cases.

Building relationships with other organic grain farmers is also a good idea. Through bartering, contracting, or simply sharing equipment and storage space, farmers can make use of resources in their area while building networks that will help to grow and solidify the organic market regionally.

Investment in cost-sharing programs to build on-farm organic grain storage would allow more organic and other identity-preserved grain to reach the market, build market share for organics throughout the year, and increase income for farmers.

The Farm Service Agency has a low-interest farm storage facility loan program for farmers interested in building or upgrading storage and handling facilities, mobile systems, and sorting and handling equipment. However, this program generally supports the purchase of new structures, which may be cost prohibitive when compared with used bins. Other USDA grant and loan programs may also be of assistance.

Food-grade grain

Cows and chickens aren't the only animals eating organic grains these days. From flour for baking, malted barley for brewing, or rolled oats for breakfast, consumers are increasingly interested in local and organic grain. While pastry flour and chicken feed are different products, the food-grade and feed-grade grain industries share some similar constraints to further growth.

"Storage really is an issue with food-grade grain," says John Wepking. Wepking farms with Bickford Organics, a 950-acre organic feed- and food-grade grain operation in Ridgeway. "Farmers have to be able to store grain until a small processor can take it," he explains. In the same way that a farmer can receive a better price by storing grain for animal feed, a wheat, oat, or barley producer can capture the same price increase by investing in storage.

"We have to work on grain quality, but being able to clean and store organic grains — that's a bottleneck," says Gilbert Williams, a miller who runs Lonesome Stone Milling in Lone Rock. While Williams has the ability to clean grain before milling it, many other mills in the Upper Midwest do not. "I won't take dirty grain. It has to come to me clean," says Rick Halverson of Great River Milling in Fountain City.

By either having a grain cleaning apparatus on-farm or having access to a grain cleaner in their area, farmers not only gain access to markets like Halverson's but will have better success storing grain. The presence of 'fines,' or small particles from harvest that a grain cleaner would remove, can endanger a whole bin of grain by holding onto moisture and reducing airflow, two of the main causes for financially ruinous mold. In addition, fines are the primary feed for insects that can infest a bin and destroy crop value.

Processors and farmers working together

The crop has been harvested, shipped to the feed or flour mill, processed, bagged, and readied for shipment. Where does that product go and how much can the processor charge? These are questions that processors have to deal with almost daily. "It can be a real challenge to get and maintain steady accounts," says Williams. Even if accounts are established, the tension between the processor and farmer is unavoidable. "If a farmer has a great year, the miller won't, and vice versa," he explains. If the raw grain is too expensive, the miller's profit margins decrease, and if grain prices fall, farmers are in a tough spot while millers stand to make a profit. This, however, isn't necessarily the only way.

"We're working to build a grain cleaning and milling collaborative with Gilbert at Lonesome Stone," explains Wepking. By working more closely together, farmers and processors can share risks and receive a more stable and predictable price for their products. Innovative partnerships such as this can help to

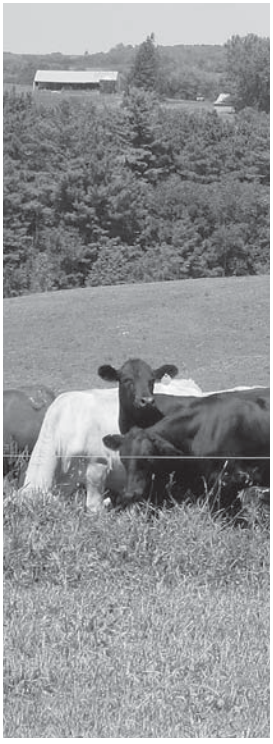
widen the bottlenecks to growth, making mutually beneficial progress possible. "We need to get a price that works on both ends," says Williams.

Facilitating growth in the organic grain industry, from the planted seed to either a gallon of milk or a loaf of bread, is not an easy or straightforward process. As Wepking puts it, "The processors have to grow together with the farmers. We all have to grow together." Through investments in on-farm storage, cleaning facilities, and close working relationships, organic grain producers and processors can maximize both the financial benefit and growth potential of their chosen industry.

Organic livestock processing

While Wisconsin ranks first in the nation for the number of farms raising organic livestock and poultry, the availability of certified organic processing poses a hurdle for these businesses. Currently, there are fewer than ten meat slaughter and processing facilities in Wisconsin that are certified organic. For farmers who market their organic meat directly to their customers and aren't as concerned about having an organic label on their product, certified organic processing may not add value. However, for producers who want to earn and build consumer trust with the organic label, organic processing is required.

Matt Lutsey calls Waseda Farms an "organic protein operation." Located in Baileys Harbor, Wisconsin, and certified organic in 2010, Lutsey and his family raise organic Berkshire hogs, meat chickens and eggs, and 100 percent grass-fed, organic Angus beef. They sell their products through an on-farm retail operation as well as the Waseda Farms Market retail store in De Pere.



Lutsey says business is booming, but it hasn't been an easy road. "Processing is a real challenge," he notes. "It was bad when we got into organics. In some ways, it's worse today. More plants are closing every year."

Lutsey says they had to travel more than two hours from their Door County farm to find processing plants willing to get certified for organic processing. Geiss Meat Service in Merrill slaughters beef and hogs for Waseda Farms. In-store butchers at Waseda Farms Market, which is certified organic, further process the meat into retail cuts. Quality Cut Meats in Cascade butchers Waseda Farms' chickens.

Andrew Geiss from Geiss Meat, a third generation meat processor, has just received certification to process animals organically at their facility from the Midwest Organic Service Association, Inc. Waseda Farms' meats will now be organic all the way from production to final processing. Geiss Meat Service slaughters 20 head of beef and 30 hogs per week and has a small retail section in their shop, where they hope to offer organic products in the future.

Geiss says the biggest incentive for him to certify organic was bringing on Waseda farms as a customer. “I had been thinking about it, but I hesitated because I’m busy enough as it is with customers and don’t have any extra time to do all the paperwork,” he observes. “But getting Waseda Farms’ business pushed me to complete the certification. I do believe it’s an opportunity for us to be in that niche market.”

Aside from the extra paperwork and cost, Geiss did not find the organic certification process overly cumbersome. But he wonders if links could be strengthened between state meat inspectors and his organic certification agency, Midwest Organic Service Association, Inc. (MOSA). State inspectors come in daily, while MOSA will only visit his shop once a year after it receives organic certification. “It’s fine, but you just don’t have that daily oversight,” he says.

Geiss has fielded numerous queries from other producers who are looking for organic processors. As a member of the Wisconsin Association of Meat Processors, he’s also noticed a new and growing interest from plant managers in getting organic certification. Geiss hopes that the growing demand for organic meat will translate into higher profits in the processing business.

Other experiences with organic livestock

Mike and Deb Hansen certified their Milladore farm as organic in 1998. Working with two other Wisconsin farms using the Good Earth Farms label, they sell frozen organic chicken, turkey, pork and beef via their website. Their customers are primarily on the east and west coasts and the southeastern U.S. Since they sell product out of state, their processors must be USDA certified.

They have experienced turnover in processors for a variety of reasons, including retirements and selling out. They are now working with their fifth poultry processor and third beef and pork processor. “We look for processing companies with passion for what they are doing,” says Mike. Good Earth Farms uses AA Poultry Processing in Ridgeland for chicken processing. AA is a relatively new plant, and Mike is impressed with their commitment to quality. Crescent Meats north of Cadott handles beef and pork processing for Good Earth Farms. Crescent is in the process of becoming certified organic, and has a very modern facility offering innovative services. He appreciates their ability to provide exact weights for packages of meat. “Organic makes a huge difference to our customers, even among those who know us,” says Mike. He is looking forward to Crescent’s certification so his beef and pork can carry the USDA certified organic label.

Vernon County farmer Jim Munsch raised organic, grass-fed beef for years, but recently dropped his organic certification. He sees a growing trend toward grass-fed beef and is now focusing exclusively on this market, selling most of his animals to a grass-fed beef cooperative and the rest directly to consumers

or meat processors. Munsch says that a producer interested in selling organic grass-fed beef would probably have to sell directly to consumers or restaurants to receive enough of a premium price to cover additional costs. Offering grass-fed beef with no antibiotics, no hormones and no internal pesticides satisfies his customers and makes finding a processor easier.

Because of the lack of capacity in organic meat processing, Organic Valley purchased Lorentz Meats and Dombrovski Meats, both in Minnesota. Organic Valley schedules these plants for its own processing needs first, and makes remaining open time slots available to other customers. Organic Valley markets meat through its Organic Prairie label.

What's ahead for Waseda farms

Lutsey says he's considered getting into the processing business, but that's not where his passion lies. And their current business model works. He projects 20-30 percent growth at Waseda Farms each year. "Our products are entirely unique: certified organic, local, grass-fed, Black Angus beef. All these things help us get premiums and continue to expand."

Lutsey would like to expand more into Chicago-area markets, and would like to use state-inspected processors to ship across state lines. Wisconsin participates in the USDA Cooperative Interstate Meat and Poultry Shipment Program, also known as Title V. Title V allows state-inspected meat and poultry plants to operate as federally inspected plants, under specific conditions, and thus ship their products into interstate commerce. Wisconsin Department of Agriculture, Trade and Consumer Protection Livestock Specialist Jeff Swenson says only a small number of state-inspected plants have applied to ship a few processed meat products across state lines, but no processors of cattle, hogs or lamb have done so.

Lutsey admits his occasional frustration with organics and adds, "Being organic is a lot more work and it's expensive. There are days when I think we should just keep doing what we're doing, and drop the certification. But we have to differentiate ourselves, and when the customers see the organic label, they are certain this is a product they can trust."

Organic vegetable processing

Fruit and vegetable growers play an important role in Wisconsin's organic industry. Wisconsin ranks second in organic vegetable and melon production, with 2014 sales valued at $17.4 million, and ranks among the top ten states for organic fruit, berry and tree nut production.

Organic vegetable processing faces unique challenges at different scales. While processing is sometimes a bottleneck for smaller scale organic

vegetable growers, larger processors are looking to grow their organic product lines. According to Nick George of the Midwest Food Products Association, there are about a dozen vegetable canning companies in Wisconsin, and they are all interested in organic products. This interest mainly stems from the fact that the organic market is growing much faster than the conventional market for canned and frozen vegetables.

When organic and conventional vegetable growers contract with canning companies, the companies manage the weed control and crop harvest. As a result, conventional vegetable yields and quality are fairly consistent, which is important in an industry with tight profit margins. However, year-to-year variation in quality and yield constrains growth in organic vegetable processing.

"Companies are trying to grow a good crop at a high enough yield and low enough cost to process and sell on the market. Right now, it's hard to do all these things on organic vegetable farms," said George.

Canning companies operating in Wisconsin are currently trying to figure out how to make their organic product lines profitable, and this may limit how many new organic acres they are willing to take on. Large retailers like Wal-Mart drive prices in the processed organic vegetable industry, which means that canners are unable to set their own price points in response to organic yields in any given year. Nonetheless, George says that vegetable canners want to be part of the growing organic market.

"As long as that market is there, they are all continuing to try to make this work," observes George. "Over time, processors will solve these problems."

Smaller-scale organic fruit and vegetable farms can boost their profits and make use of seconds with value-added processing, if they have access to licensed processing facilities. Viroqua-based Fizzeology Foods, owned by Faith Anacker since 2013, processes raw, cultured foods using vegetables and other ingredients sourced from small organic farms. Anacker's mission is "to raise health awareness, one gut at a time, marketing real foods in harmony with nature." She's also on a mission to develop a sustainable business model.

Fizzeology produces five fermented products—including German sauerkraut and Korean kimchi—using vegetables such as cabbage, carrots, onion, red pepper, radishes and parsnips. All are purchased from local farmers, and many as seconds that would otherwise go to waste. While Anacker uses certified organic ingredients, her product isn't certified organic. Fizzeology products are available in pints, quarts and gallons, at wholesale, retail and distributor pricing, and shipped regionally in full case volume.

Anacker rents kitchen space to process her products at the Vernon Economic

Development Association's Food Enterprise Center. This regional food hub is a 100,000 square-foot multi-tenant facility, offering spaces for aggregation, storage, processing and distribution, plus business development resources.

Susan Noble, executive director of the Development Association, says they currently have four produce aggregation companies in the Enterprise Center, with at least two of them focused on organic. One of these companies, the Fifth Season Cooperative, works with more than 40 small, local, organic growers to market their produce to hospitals, schools, restaurants and co-op grocery stores in the greater Driftless Region, Minneapolis, Milwaukee, Madison and Chicago. Another tenant, Kickapoo Valley Produce, markets organic produce from 20 to 25 such growers to retail stores in the Upper Midwest.

Noble sees a great need for more vegetable processing facilities that serve entrepreneurs like Anacker, who are producing a value-added product. The Enterprise Center is ready to accommodate value-added processing with their existing infrastructure; what's lacking is investment for growth, especially with technologies such as IQF (Individual Quick Frozen) or dehydrating.

Noble notes that Fifth Season Cooperative processes two of their organic frozen vegetable blends at Sno Pac Foods in Minnesota rather than in-state. "For that kind of volume, to do processing and private labeling, there are very few options in Wisconsin. That is really the bottleneck."

Anacker says that, while the Food Enterprise Center is perfect for her small-scale processing needs, her main hurdle is distribution. She aims to produce small batches of a high-quality product, which puts her in a bind: She's not achieving an economy of scale that makes room for distribution costs in product pricing, but distributing her own product limits her marketing options.

She currently sells Fizzeology in several dozen stories, primarily in Wisconsin, including food cooperatives and Hy-Vee grocery stores. Rather than use distributors, she says, "We do a lot of trucking stuff around ourselves."

Sarah Lloyd, Development Director of the Wisconsin Food Hub Cooperative, affirmed the distribution challenges for value-added, processed products like Fizzeology fermented foods. The Food Hub Co-op aggregates and distributes organic and conventional products from family farms in Wisconsin, helping them access mid-size buyers who may not want to work with individual farmers. While this approach is generally working well for fresh produce, the co-op has struggled with distributing value-added products.

"The main barrier is volume," says Lloyd. "A grocery store tends to want two or three cases of processed product at a time. But to cover transportation costs for these products, grocers would need to buy them by the pallet, not the case.

If you can get into more centralized warehouses for distribution into a chain or group of stores, you then need to pay slotting fees to the warehouse, which is cost prohibitive for small producers and processors."

Because of this distribution barrier, Anacker is modifying her business plan and focusing more on direct marketing. While she notes that direct sales can eliminate the need for organic certification and labeling, Anacker chooses to keep using certified organic ingredients for a strategic reason—she's in the process of negotiating a contract packer agreement for what will become a nationally available, certified organic product that she will process, using the packer's recipe.

"I modeled my operation procedures from the organic standards," she adds. "That's a great way to differentiate and diversify."

Ultimately, Anacker sees the need for a more level playing field for small businesses. "Big businesses get a lot of support. We need to find more real benefits to small, organic vegetable businesses."

Processing can be challenging for small-scale, organic vegetable growers who lack access to facilities like the Food Enterprise Center. Gail Carpenter and her daughter, Lindsey, operate Grassroots Farm, LLC, a certified organic operation in Green County. Grassroots Farm is more than a hundred miles from Viroqua and faces processing barriers.

Carpenter has operated Grassroots Farm since 2008. This 40-acre, highly diversified farm produces more than 75 varieties of organic vegetables, fruits and fresh herbs, livestock, and cut flowers. They sell their produce through Community Supported Agriculture (CSA), farmers markets, and limited sales to groceries and restaurants.

In 2013, Carpenter got her Wisconsin food processor license, inspired to offer processing services to others who wanted to add value to their own produce. She sees value-added processing as a win-win opportunity to use seconds and take advantage of bumper crops. However, she soon found that, between the time commitment of processing vegetables and the added costs of other ingredients, even using produce from her own farm did not offer her a sustainable business model. "Often, small-scale processing by small vegetable producers just doesn't make economic sense," she says.

Carpenter is currently processing her produce within the confines of Wisconsin's Pickle Bill, which allows individuals to sell up to $5,000 worth of home-canned pickles and other acidic fruits and vegetables without a processing license. Under the Pickle Bill, she processes tomatoes, vegetable juice, pickles, jams and jellies among other things, which she sells at community events.

"I'm still looking for opportunities," she said. "There is a real need out there for small- and mid-sized vegetable processing. We have a lot of waste, and I know many others have the same story. I'm not giving up."

Organic dairy processing

While lack of meat and vegetable processing can pose a barrier for organic growers in Wisconsin, this is not the case for organic dairy. Many dairy plants have secured organic certification in order to process milk on a contract basis from Organic Valley, an independent cooperative of organic farmers based in La Farge.

When Organic Valley introduced their organic dairy product line in 1989, they made a conscious decision to work with existing dairy processors, rather than invest in their own brick and mortar facilities. These strategic partnerships enabled them to reinvest profits into growing their co-op instead of paying off loans for facilities.

According to Kevin Kiehnau, Organic Valley's East Central Division Manager, the co-op owns two processing facilities: a butter processing plant in Chaseburg, Wisconsin, and a recently purchased creamery in McMinville, Oregon, that will produce bottled and powdered milk, as well as butter. These two plants account for just a fraction of their processing, however. Most of their organic dairy product line is processed through contracts with over 100 plants across the United States.

Kiehnau says that contracting with existing processors is working well. "The only times we run into issues are the holidays, when the plants shut down, and the spring flush that starts in April and peaks in late May and June," Kiehnau observes. Organic Valley books processing plants in advance to ensure enough capacity for the spring flush, which can result in up to 5.8 million pounds more milk than is typical at other times of the year.

"We've never had a situation where we couldn't process our milk," says Kiehnau.

Organic Valley processes most of their hard cheeses in Wisconsin, because of the need to provide a consistent product. Kiehnau says, "Finding cheesemakers out of state who can hit the flavor profile is a challenge."

Most of Organic Valley's processing partners work with both organic and conventional milk. The plants must be certified organic and maintain records for certification inspections. The processors will typically run Organic Valley's milk through the plant first thing in the morning, when the equipment is clean, to avoid contamination with conventional milk. Processed organic products must

be stored separately from conventional products, to avoid any chance of commingling.

Kiehnau notes that their dairy processing partners own their organic certification and can work with organic products from any business.

Down the road, Organic Valley may invest in more processing plants. At the end of 2015, Organic Valley became the first organic-only food business to reach a billion dollars in sales. With this growth, they are considering expansion of their own processing capacity. "It's reasonable to think, going into the future, we will want a plant in each region we serve," says Kiehnau.

Market share and product diversification

"The organic dairy sector continues to grow, and 2016 has been a year of growth for us," says Jerry McGeorge, Vice President of Cooperative Affairs at Organic Valley, "Wisconsin continues to be at the top of the nation in terms of organic dairy, so we've expanded membership here just as elsewhere."

Due to depressed prices for conventional milk, dairy farmers across the country are contacting Organic Valley about getting into the organic market. "Between production costs and low commodity prices, 2016 has been the roughest period, financially, for conventional dairy producers since 1979," says Kiehnau. "The people who are contacting us have had organic farming on their minds. They had some interest before, and the current financial situation has pushed them off the fence."

Organic Valley is unable to take on all of these new farmers, however. A challenge for the company has been a slower pace of growth than anticipated in 2016. In 2014-15, the organic industry as a whole was struggling to keep up with consumer demand, which is ultimately tough to gauge. Organic milk is still a niche, representing only five to six percent of overall dairy sales in the U.S. After adding more growers, a small shift in demand put Organic Valley in a high supply situation in 2016. "This is a short-term hiccup. It's definitely not the case that we're not growing," McGeorge adds. "We continue to believe the long-term outlook is very good."

McGeorge notes that Organic Valley is looking at a five to six percent growth rate for 2017. He says that prior to 2009, Organic Valley grew about 20 percent each year. When the recession hit, it took the business a year to start growing again. From 2010 to 2014, the company saw double digit growth.

One area of growth for Organic Valley is their Grassmilk product line, launched nationally in 2013. It includes non-homogenized grade A milk and yogurt from cows fed grass and dried forages, and no grains. "There was

a real consumer demand for these products, and we're excited about them," McGeorge says, adding that Organic Valley may look to expand this line in the future.

Pete Kondrup, general manager at Westby Creamery, confirms growth at his farmer cooperative as well. One of the oldest dairy cooperatives in the U.S., Westby has been in the business of organic milk products for nearly 10 years, producing organic hard cheese, cottage cheese, sour cream and yogurt. Five years ago, Westby's organic products were about 20 percent of their volume; now, organics are 50 to 60 percent. Of their 220 farmer members, 160 are now certified organic.

The overall amount of organic milk we've taken has increased every year since we started," Kondrup says. "This year we've seen about 15 percent increase in organic milk from our members."

"Organic processing has been good for us," he adds. "It's definitely given us a bright future."

It's not just about cows

An area of growth within Wisconsin's organic dairy industry is goat milk. In 2014, Wisconsin produced 10 percent of the organic cow milk and 22 percent of the organic goat milk sold in the U.S., more than any other state.

Diana Murphy of Dreamfarm in Cross Plains may contribute a small amount of goat milk to that total, but her farm means a lot to her customers. Murphy, a licensed cheesemaker, milks 28 goats—and one Jersey cow—and crafts their milk into fresh and aged cheese in her certified organic, on-farm creamery. She sells products at farmers markets and to the Willy Street Coop in Madison, as well as restaurants and members of a nearby Community Supported Agriculture (CSA) farm.

Murphy said she'd like to see the state provide more help to small-scale dairy producers: "For those of us who have intentionally decided to stay small, it seems like there's not much support out there." She relied heavily on support from the Dairy Business Innovation Center, which lost federal funding and shuttered in the fall of 2012. "Smaller farmers have kind of been left in the dark and left to figure things out on their own. If you're not part of commodity markets, you don't get much support."

As she considers her future, Murphy is proud of her products and confident of her customers' loyalty. "In some ways I'm concerned about the bigger dairies, but in other ways, people know we are small-scale and we are organic. They want to continue to support us."

Apprendix A. The Wisconsin Organic Advisory Council

TThe Wisconsin Organic Advisory Council (OAC) is a private-sector body appointed by the DATCP Board to advise agriculture agencies on organic agriculture issues.

About

The Advisory Council was established in response to recommendations by the 2004 Governor's Task Force on Organic Agriculture. The group first met in February 2006. A cooperating Interagency Team composed of representatives of major state and federal agriculture agencies meets with the Council.

Mission statement

The Wisconsin Organic Advisory Council brings together public and private resources to promote Wisconsin's national leadership position in organic agriculture. By advising the Secretary of the Wisconsin Department of Agriculture, Trade and Consumer Protection and other organizations and agencies on critical organic issues, the council supports organic production, processing and purchasing opportunities for Wisconsin farmers, processors, and consumers.

Purpose

The purpose of the Organic Advisory Council is to provide guidance to the secretary of agriculture, the governor, the legislature and other state agencies on actions that can be taken to further the Wisconsin organic industry. The council conducts its business via quarterly all-day meetings.

Structure

The council consists of 12 people representing the spectrum of organic production, processing, and marketing in Wisconsin, including:

- Three certified organic farmers, preferably reflecting several types of farms (dairy, vegetable, etc.).
- Three organic business sector representatives.
- One representative of organic consumers.
- One representative of a private, non-profit educational organization involved in organic agriculture.
- One representative of the certification industry.
- Three at-large members.

Council members serve three-year terms with four terms expiring each year. The nomination period takes place in early spring each year, with selections announced in May or June.

Organic Advisory Council activities

The Organic Advisory Council and Interagency Team meets three to four times annually. It supports growth in the organic sector through council-sponsored projects, representing organic agriculture on a number of agency committees, developing written recommendations and letters of support, and providing advice and recommendations to agencies and organizations.

Current Wisconsin Organic Advisory Council Members as of January 2017

Organic farmers
Steve Pincus – organic vegetable farmer
(term ends July 2019)
Tipi Produce
Evansville, WI

Gerald Klinkner – organic dairy farmer
(term ends July 2018)
Klinkner Family Farm
Cashton, WI

Tony Kurtz – organic crop farmer
(term ends July 2017)
Wonewoc, WI

Organic business representatives
Tony Saarem (Council co-chair)
(term ends July 2018)
GoMacro, LLC
Viola, WI

Adam Warthesen
(term ends July 2019)
Organic Valley
La Farge, WI

Ken Sequine
(term ends July 2017)
Hay River Pumpkin Seed Oil
Prairie Farm, WI

Non-profit representative
Harriet Behar (Council co-chair)
(term ends July 2017)
Midwest Organic and Sustainable Education Services
Spring Valley, WI

Consumer representative
Mariann Holm
(term ends July 2019)
Elk Mound, WI

Certification representative
Steve Walker
(term ends July 2018)
Midwest Organic Services Association
Viroqua, WI

At-large members
Bill Stoneman
(term ends July 2018)
Biopesticide Industry Alliance Inc. (BPIA)
McFarland, WI

Chris Blanchard
(term ends July 2019)
Purple Pitchfork
Madison, WI

Ron Mason
(term ends July 2017)
Midwestern BioAg
Blue Mounds, WI

Interagency team
Julie Ammel
NRCS State Office
Madison, WI

Laurie Makos
Iowa County FSA Office
Dodgeville WI

Kevin B. Shelley
UW Nutrient & Pest Man. Program
Madison, WI

Coreen Fallat
DATCP-ARM
Madison, WI

Will Erickson
WI DNR
Madison, WI

Cate Rahmlow
Industry Sector Manager
Wisconsin Economic Development Corporation
Madison, WI

Dan Smith
Division Administrator
WI DATCP-DAD
Madison, WI 53708

Erin Silva
Organic and Sustainable Cropping Systems Specialist Department of Plant Pathology, University of Wisconsin-Madison
Madison, WI

Coordinator
Angie Sullivan
Ag Program Specialist
Organics, Grazing & Specialty Crops
WI DATCP-DAD
Madison, WI

Appendix B. Active UW-Madison organic research

The following information was gathered through a search of the USDA Current Research Information System and updates from researchers. This list may not include all organic research occurring at UW-Madison, or other research projects that may impact organic agriculture. If you have any questions about organic research at UW-Madison, please contact Erin Silva at 608-890-1503 or emsilva@wisc.edu.

Alternative Methods for Identifying Optimal Diversification Strategies for Multi-Crop Vegetable Farms

Researchers: Brad Barham (UW-Madison Department of Agricultural and Applied Economics, (608) 265-3090, bradford.barham@wisc.edu), Erin Silva (UW-Madison Department of Plant Pathology), and John Hendrickson (UW-Madison Center for Integrated Agricultural Systems)

Description: The long-term goal of this project is to provide a framework for diversified vegetable producers (including organic producers) to determine optimal diversification strategies for both beginning and experienced farmers seeking to improve their net income performance. 1) Conduct innovative surveys of farmers and, to a lesser extent, consumers, incorporating these data in econometric models of optimal diversification strategies, and complementary historical studies focusing on optimal marketing and production diversification strategies for small and medium sized multi-crop vegetable operations; 2) Provide information on how marketing initiatives and producer operations could be better matched to improve farm profitability and the efficient delivery of vegetable products; 3) Inform public policy and program development that could help to guide the design of rules and institutions related to direct marketing arrangements.

The Details that Matter: Second Generation Answers for Organic Reduced Tillage Production Systems

Researcher: Erin Silva (UW-Madison Department of Plant Pathology, 608-890-1503, emsilva@wisc.edu)

Description: This project investigating no-till organic agriculture will further refine the no-till technique using cover crops in order to enhance soil quality, improve soil biological processes, and maximize weed management potential while minimizing the possibility for soil erosion. Through this research, farmers will be able to use this technique more effectively through improved management guidelines. The objectives include: 1) evaluate both cereal rye and soybean variety performance and soil quality of organic reduced tillage systems through the measurements of several key indicators (soil organic matter, particulate organic matter, soil respiration, compaction, and crop yield); 2) optimize soybean planting date relating to this system; 3) evaluate the potential of this system to manage late-season annual broadleaf weeds that are particularly detrimental to organic row crop productivity; and 4) engage organic farmers in research and outreach activities. A key outcome of this phase of the project will provide an additional set of indicators regarding soil quality and provide valuable management recommendations that would reduce risk to organic farmers and allow for wider-scale adoption of this system.

Assessing Genotype by Environment (G X E) Interaction and Heritability of Vegetable Crops in Organic vs. Conventional Production Systems

Researchers: Erin Silva (UW-Madison Department of Plant Pathology, 608-890-1503, emsilva@wisc.edu) and Philipp Simon (United States Department of Agriculture-Agricultural Research Service (USDA-ARS))

Description: The long-term goal of this project is to determine the most effective and efficient strategies for breeding vegetable cultivars optimized for organic production systems. In order to achieve this long-term goal, the proposed project has four supporting objectives: 1) Compare the impact of selection for key traits in organic versus conventional systems on F_3-F_5 generations using carrot and snap bean as model crops; 2) measure genotype x system (G x S) (organic vs. conventional) and genotype x location (G x L) (Oregon and Wisconsin) interactions of model crops for several key economic traits, as well as the heritability of traits in the two systems; 3) determine the genetic correlation between systems and locations; and 4) use next generation sequencing methods to discover changes at the genome level from selection in organic vs. conventional systems.

NOVIC: Northern Organic Vegetable Improvement Collaborative

Researchers: Erin Silva (UW-Madison Department of Plant Pathology, 608-890-1503, emsilva@wisc.edu) and William Tracy (UW-Madison Department of Agronomy)

Description: The overall goal of this project is to increase the number of vegetable varieties that have the best performance potential in organic systems over a wide seasonal window. While many excellent vegetable

varieties have been bred in and for conventional systems, these varieties are not necessarily adapted to organic systems. The number of available varieties has been increasing, but the choices for organic growers are still very limited. With adapted and appropriate varieties, organic growers will increase market share with improved vegetable varieties that are adapted specifically to organic systems and combine the needs for extended market presence, disease resistance, nutritional and flavor quality, and contemporary productivity traits that are crucial to success in modern markets. Another long-term goal is to enhance compliance with the National Organic Program (NOP) requirement for use of certified organic seed. There is still too little certified organic seed available to close the loophole that allows a grower to use untreated conventional seed when organic seed of an equivalent variety is unavailable.

CIOA: Carrot Improvement for Organic Agriculture

Researchers: Philipp Simon (USDA-ARS, 608-262-1248, philipp.simon@ars.usda.gov), Erin Silva (UW-Madison Department of Plant Pathology), and Julie Dawson (UW-Madison Department of Horticulture)

Description: The long-term goals of this project are to 1) develop and release carrot germplasm with improved disease and nematode resistance, improved nutrient acquisition, seedling vigor and weed competitive traits, marketable yield, superior nutritional value, flavor and other culinary qualities, and storage quality for organic production; 2) determine how carrot genotypes interact with their root microbiome to access key nutrients under limiting environments and avoid heavy metal uptake; 3) inform growers about cultivar performance to maximize organic carrot production, markets and organic seed usage; 4) inform consumers about the positive environmental impact of organic production systems, and about carrot nutritional quality, flavor and culinary attributes; and 5) train undergraduate and graduate students and postdocs in critical organic agriculture issues. This project builds from accomplishments of a previous four-year cycle funded by the USDA.

OGRAIN: Organic Grain Resource and Information Network

Researchers: Anders Gurda (UW-Madison Department of Plant Pathology, agurda@wisc.edu) and Erin Silva (UW-Madison Department of Plant Pathology)

Description: The long-term goal of the Organic Grain Resources and Information Network (OGRAIN) is to increase the number of organic grain farmers in the Upper Midwest. OGRAIN will achieve this goal through the development of an educational resource base for organic production targeted toward beginning farmers growing a variety of grains (corn, soybeans, and small grains) for animal feed and human consumption. The project's target audience includes: 1) Junior operators coming into managerial roles on established farms hoping to improve organic production or transition some or all of their conventional acres to organic production; 2) New farmers interested in entering the organic grain market; 3) Organic livestock producers who have been farming for fewer than 10 years interested in growing their own organic feed; and 4) Beginning organic vegetable farmers looking to expand their salable crops to include small grains, heritage grains, and value-added, grain-based products. While emerging farmers within these demographics operate at different scales across the Upper Midwest, their opportunities, challenges, and needs, are similar. OGRAIN will create a suite of workshops, trainings, mentorship opportunities, events and educational materials to address challenges in production and marketing identified by the four target groups.

Cultivar Influence on Arbuscular Mycorrhizal Community Structure and Abundance in Organically Managed Soils Using Varieties of *Daucus carota*

Researchers: Michelle Keller-Pearson (UW-Madison Cellular and Molecular Biology Program, michelle.keller-pearson@wisc.edu) and Erin Silva (UW-Madison Department of Plant Pathology)

Description: Beneficial soil microbial communities are essential to ameliorate the nutritional and moisture-limited conditions in which organically cultivated plants grow. These communities are diverse and abundant in natural systems. Historically, agricultural practices hinder microbial communities through over-fertilization, fungicide application, and monoculture cropping. Organic systems have the ability to improve soils by stimulating increased species diversification through cultivation of mycorrhizal and rhizobial plant species. These symbiotic microbes increase plants' access to vital nutrients like nitrogen (N) and phosphorus (P). Arbuscular Mycorrhizal Fungi (AMF) deliver water, N, P, and other nutrients to plants, which contributes to increased biomass and improved crop yields. In exchange, host plants provide sugars to the fungus, which are obligate symbionts. Vegetables benefit from their symbiotic association with AMF, with many crop species known engage in symbiosis with many AMF species, enabling the fungi to proliferate. Although the importance of this association is widely understood, it is unknown whether different cultivars of a single crop differentially stimulate AMF populations. Here, we propose to study this cultivar-AMF interaction in an on-farm setting using carrot as a model crop and evaluate the contribution to carrot biomass as well as the contribution of

potential cultivar-symbiont selectivity on AMF populations in a variety of soil types across organic farms in Wisconsin.

Lab to Farm: Integrating Organic Cucurbit Science and Production in the Midwest

Researcher: Erin Silva (UW-Madison Department of Plant Pathology, 608-890-1503, emsilva@wisc.edu)

Description: This project, led by the Michigan State University, will investigate a variety of aspects of cucurbit production identified as priorities by organic farmers. These include better weed, disease and pest management, particularly related to cucumber beetle, downy mildew and *Phytophthora*; and reduced tillage practices, cover crops, nitrogen management and pollination.

Tomato Variety Trials for Flavor, Quality and Agronomic Performance, to Increase High-value Direct Marketing Opportunities for Farmers and On-farm Trialing Capacity

Researcher: Julie Dawson (UW-Madison Department of Horticulture, (608) 609-6165, dawson@hort.wisc.edu)

Description: This project will conduct organic and low-input IPM field trials investigating selection of tomato varieties for optimal economic and environmental sustainability on two research stations and on six participating farms. We will identify 20 tomato varieties based on farmer and plant breeder recommendations described as having good fresh market flavor and quality that may have promise for producers in the North Central Region (NCR). We will evaluate these for regional adaption of agronomic traits and disease resistance in both organic on-station and on-farm trials. We will also evaluate flavor for each variety with a panel of chefs interested in sourcing local products. Plant nutritional analysis, pH and brix measurements will be used to characterize each variety and identify potential correlations with quality and flavor. These trials and participatory evaluations will provide data for breeders, researchers, farmers and seed companies to identify both promising varieties and traits needing improvement for the NCR. Building from these trials and end-use evaluations, we will develop a network of farmers, extension specialists and chefs interested in participatory research. Incorporating data from this project, we will create an online database that will be easy for farmers to both access and contribute, following the model of successful citizen science projects and participatory plant breeding trial methodology. This database will serve as a foundation for future vegetable variety trials focused on regional adaptation. This project will provide immediate results and recommendations for tomato varieties with the agronomic and quality characteristics needed in the NCR, while establishing a framework for long-term participatory research and trialing of varieties for diversified farms and sustainable agricultural systems.

Practical Approach to Controlling Foliar Pathogens in Organic Tomato Production through Participatory Breeding and Integrated Pest Management

Researcher: Julie Dawson (UW-Madison Department of Horticulture, (608) 609-6165, dawson@hort.wisc.edu)

Description: Demand for organic, fresh-market tomatoes continues to increase at a rapid pace, yet growers struggle to meet this demand because of foliar pathogens that move quickly through fields and decimate entire crops. Modern hybrid varieties with resistance are available, but they lack the flavor demanded by organic consumers. Consequently, organic growers often plant susceptible heirloom varieties because they are perceived to have superior flavor. Copper fungicides provide fair control of foliar pathogens, but they must be applied early and repeatedly to obtain adequate control, and copper accumulation negatively impacts soil and water quality. This multi-state, inter-disciplinary project led by Purdue University will address these challenges by developing an integrated management plan that includes selection of improved tomato varieties, identification of strategies that boost plant immune responses via interactions with beneficial soil microorganisms, and identification of organic fungicides combinations that reduce copper application. Vegetable growers will be actively involved in all aspects of this project, and will gain practical hands-on experience with participatory breeding and soil and pathogen management. We will release organic tomato varieties and inbred lines that are resistant to early blight, late blight and Septoria leaf spot, and have fruit with good flavor. We will utilize "next-generation" sequencing technologies to identify the molecular basis for induced systemic resistance (ISR) in tomato, and determine how soil management practices alter microbial communities and ISR expression on organic farms. These activities will improve profitability and sustainability on organic farms, and provide genetic tools that can be used in future research.

Soil Carbon and Microbial Community Dynamics in Organic Cash Grain Rotations under Intensified Cover Cropping and Reduced Tillage

Researchers: Gregg Sanford (UW-Madison Department of Agronomy, (608) 890-0739, gsanford@glbrc.wisc.edu), Gary Oates (UW-Madison Department of Agronomy), Erin Silva (UW-Madison Department of Plant Pathology)

Description: In order for organic producers to realize gains in soil organic carbon (SOC), below-ground carbon inputs from root exudates, root turnover, and microbial biomass must exceed losses from soil respiration. Soils with inherently high native SOC, like the prairie soils which dominate the North Central US, do not lend themselves as easily to C sequestration as compared to soils with lower productivity. However, organic farmers in the Upper Midwest, most of whom regularly use of cover crops, are well positioned to make significant gains in soil carbon accrual where conventional systems cannot. The objectives of this research are: 1) understand the impacts of cover crop intensification and tillage reduction on the total biomass and functional composition of the soil microbial community; 2) develop a conceptual model of soil carbon dynamics by linking microbial community dynamics with SOC dynamics; and 3) optimize organic grain rotations for sustained crop yield and carbon sequestration. A key outcome of the proposed research will be to develop an organic agriculture-specific model for soil carbon and microbial dynamics as they relate to cover crop intensification and tillage reduction, and to provide valuable management recommendations that will serve to simultaneously maintain high organic crop productivity and increase beneficial ecosystem services.

Wisconsin Integrated Cropping Systems Trial (WICST)

Researchers: Randy Jackson (UW-Madison Department of Agronomy, rdjackson@wisc.edu) and Gregg Sanford (UW-Madison Department of Agronomy)

Description: The Wisconsin Integrated Cropping Systems Trial (WICST) Project was initiated in 1989 to address issues of sustainability of alternative farming systems. The hub of the WICST project activities are two crop rotation trials at Arlington Agricultural Research Station in Columbia County (affiliated with the University of Wisconsin) and the Lakeland Agricultural Complex in Walworth County (the county-owned farm). These trials compare three cash grain and three forage-based production systems, within which two organic systems are included. The production systems vary in crop diversity and use of purchased inputs. They range from continuous corn to rotational grazing and the performance criteria include productivity, environmental impact and profitability. The WICST project results to date show that diversified, organic systems are productive and profitable. Well-managed organic systems are no riskier than high-input systems, and organic systems offer potential environmental benefits.

The LAND (Livelihood, Agroecology, Nutrition, and Development) Project

Researcher: Michael Bell (UW-Madison Community and Environmental Sociology, (608) 262-5201, michaelbell@wisc.edu)

Description: The LAND (Livelihood, Agroecology, Nutrition, and Development) project is working to develop organic, agroecological approaches to development in South Africa, working with an indigenous community on tribal land in the foothills of the Drakensberg Mountains, and working with the Ratang Bana organic urban garden for vulnerable children in a low resource district in Johannesburg. This project is a partnership between the Center for Integrated Agricultural Systems, Kidlinks World, and Indwe Trust.

Evaluation of Organically Approved Fungicides for Vegetable Crops

Researcher: Amanda Gevens (UW-Madison Vegetable Pathology, 608-890-3072, gevens@wisc.edu)

Description: This program evaluates the efficacy of OMRI and organic-approved fungicides for control of diseases in potato and vegetable crops in Wisconsin. Evaluation of materials is carried out both in production fields and in university greenhouses and laboratories. Results are extended to producers at various educational sessions throughout the year and via the Vegetable Crop Updates newsletter from UW-Madison.

Evaluation of Organically Approved Pesticides for Organic Vegetable Crops

Researcher: Russell Groves (UW-Madison Department of Entomology), 608-262-3229, groves@entomology.wisc.edu)

Description: This program evaluates the efficacy of organically approved compounds against some of the more commonly found vegetable insect pests faced by Wisconsin's organic vegetable producers.

Chasing Dirt: Breeding Earthy and Mild Beets for Wisconsin Growers and Eaters

Researchers: Solveig Hanson (UW-Madison Plant Breeding and Plant Genetics Program, shanson7@wisc.edu) and Irwin Goldman (UW-Madison Department of Horticulture)

Description: This project, formally titled 'Consumer-engaged participatory plant breeding model comparison

and beet flavor breeding,' will evaluate two participatory breeding methods while developing flavor-identified table beet cultivars in organic systems. A single-farm model will be compared with a broad-outreach model; in both cases, farmers will determine field performance and quality priorities, and consumers will select beet populations based on flavor and color preference. Models will be evaluated for cost effectiveness, participant satisfaction, gain by selection for beet flavor components, and market relevance of the resulting beet germplasm.

Improving Germination Percentage of Yellow Table Beet Germplasm in Organic Conditions

Researcher: Irwin Goldman (UW-Madison Department of Horticulture, (608) 262-7781, ilgoldma@wisc.edu)

Description: Yellow-rooted table beet cultivars have been available for more than 100 years and are known for their beautiful interiors and mild, sweet flavor. In recent years, the popularity of yellow-rooted cultivars has increased, and several varieties have recently been released in the market. Most of the new yellow-rooted varieties have 'Burpee's Golden' in their pedigree, a cultivar known for its poor seed germination. We have initiated a project to improve the seed germination percentage of yellow-rooted table beet germplasm through two breeding methods: recurrent selection and pedigree selection. Breeding lines and populations from our program that had been previously selected for root and eating quality, particularly selections from open pollinated populations called 'Badger Gold' were grown in replicated plots in organic conditions at the West Madison Agricultural Research Station in Madison in 2016. Stand counts were taken by counting the number of plants in a one meter length of row approximately five weeks after planting. The best families were chosen for harvest. Selected roots from each breeding line were vernalized for 10 weeks at 6° C and will be planted in the greenhouse in December, 2016. Selected lines will be intermated in a half-sib family recurrent selection scheme and also intermated in line x line crosses under a pedigree breeding scheme during the winter and spring, 2017. Seed will be sown in replicated plots in 2017 where these cycles will be repeated.

New Methods for Participatory Development of Sugary Enhancer Sweet Corn Varieties for Organic Systems

Researchers: Tessa Peters (UW-Madison Plant Breeding and Plant Genetics Program, tessa.peters@wisc.edu) and William Tracy (UW-Madison Department of Agronomy)

Description: The goal of this research is two-fold: to develop agronomically sound sweet corn for release using a participatory breeding program and to evaluate commercially available varieties with diverse genotypes for potential use in organic systems. These goals will be achieved through four distinct research projects and the creation of a manual for creating and saving open pollinated sweet corn seed.

Efficient Methods to Develop New Sweet Corn Cultivars for Organic Systems

Researchers: Jared Zystro (UW-Madison Plant Breeding and Plant Genetics Program, jared.zystro@wisc.edu) and William Tracy (UW-Madison Department of Agronomy)

Description: The objective of this research is to determine the utility of using structured mating designs and genotypic information to select untested sweet corn hybrids and synthetic varieties for organic farming systems. Trials of 100 sweet corn hybrids formed from four 5x5 NC DII mating blocks along with the 40 parental inbreds will be carried out in 12 organic environments total over two years.

Building Resilience and Flexibility into Midwest Organic Potato Production: Participatory Breeding and Seed Potato Production

Researchers: Ruth Genger (UW-Madison Department of Plant Pathology, (608) 265-3056, rkg@plantpath.wisc.edu) and Doug Rouse (UW-Madison Department of Plant Pathology)

Description: Organic farmers in the North Central Region face a shortage of organically produced seed potatoes, limited availability of desired specialty varieties, and limited information on variety performance under organic management. Very little potato breeding and selection focuses on the needs of organic farmers. A decentralized system of seed potato production and breeding by a network of organic farmers would meet regional seed potato demands, enable farmers to evaluate and select outstanding lines from crosses between existing varieties, and promote interaction and learning among farmer peers. This collaboration between researchers and farmers is developing goals for breeding and seed production, trialing seed potato production and breeding on organic farms, and assessing the economic impacts of on-farm seed potato production.

Increasing the Sustainability of Organic Potato Production through Improved Soil, Water and Weed Management and Targeted Breeding: a Participatory Approach

Researchers: Ruth Genger (UW-Madison Department of Plant Pathology, (608) 265-3056, rkg@plantpath.wisc.

edu) and Doug Rouse (UW-Madison Department of Plant Pathology)

Description: The objectives of this project are to: 1) optimize organic potato production systems to maximize yield and tuber health while also improving soil, water and weed management; and 2) trial potato breeding lines and heirloom/specialty potato varieties on organic farms in the Midwest. Research station and on-farm trials to compare mechanical cultivation and straw mulching of organic potato crops found higher yields and lower weed pressure when straw mulch was applied at potato emergence. Farmer participation in on-farm trials of potato breeding lines and heirloom varieties has identified varieties with strong potential for direct markets.

Breeding Natural Resistance to Sweet Corn Husk Length and Corn Earworm Resistance

Researchers: Virginia Moore (UW-Madison Plant Breeding and Plant Genetics Program, vmmoore@wisc.edu) and William Tracy (UW-Madison Department of Agronomy)

Description: This research focuses on breeding sweet corn for resistance to the corn earworm *(Helicoverpa zea)*. *H. zea* is a major insect pest in maize, and is especially problematic in organic cropping systems, which have a limited set of available management options. The overall objective of this research is to identify alternative methods of managing *H. zea* through resistance breeding. The primary breeding focus is on husk extension and its interaction with other plant traits and management factors. The research is composed of three studies, with specific goals related to this broader theme. The studies include two traditional breeding experiments and one study examining the broader social context of *H. zea* management on organic farms.

Seed to Kitchen Collaborative Participatory Vegetable Variety Evaluation and Selection for High-quality Organic Produce in the Upper Midwest

Researchers: Julie Dawson (UW-Madison Department of Horticulture, (608) 609-6165, dawson@hort.wisc.edu), Bill Tracy (UW-Madison Department of Agronomy), Ruth Genger (UW-Madison Department of Plant Pathology), Irwin Goldman (UW-Madison Department of Horticulture), Philipp Simon (UW-Madison Department of Horticulture), Yiquen Weng (UW-Madison Department of Horticulture), Jim Nienhuis (UW-Madison Department of Horticulture), Ken Kmiecik (UW-Madison Department of Horticulture)

Description: This collaboration among farmers, chefs and plant breeders presents a unique opportunity to focus on vegetable variety characteristics important to local food systems. These include flavor, fresh-market quality and agronomic performance on smaller-scale diversified farms. The goals of the project are 1) to promote informal collaborations between breeders, farmers and chefs to improve selection for flavor and direct market quality; 2) Evaluate new and soon-to-be-released varieties for culinary traits in restaurants with participating chefs and for agronomic performance on direct-market farms; and 3) Develop better methods of evaluating and selecting for flavor and culinary quality. Crop priorities are set by participating farmers, and different seed companies, university breeders and independent breeders contribute varieties for evaluation. We trial all varieties on organic land at the West Madison Agricultural Research Station and farmers choose subsets of these varieties to trial on-farm. We work with chefs to evaluate varieties for flavor and culinary quality. Results from variety trials, on-farm trials and flavor evaluations are posted each year at dawson.horticulture.wisc.edu.

Strategies for Effectively Using Genetic Resources in Cultivar Development for Local Food Systems

Researcher: Julie Dawson (UW-Madison Department of Horticulture, (608) 609-6165, dawson@hort.wisc.edu)

Description: Local food systems are growing in importance, often in conjunction with the growth in organic agriculture. One of the defining characteristics of local produce is its quality, particularly flavor. Heirloom vegetable varieties are often used because of their superior flavor, and this use makes a significant contribution to the conservation of genetic diversity. However, these genetic resources and those in ex-situ collections are often not well characterized and are underutilized by the plant breeding community. Plant breeders who wish to develop cultivars for organic agriculture or who wish to incorporate complex traits like flavor into breeding programs would benefit from tools for identifying interesting accessions from genetic resource collections, and tools for improving the phenotypic evaluation of complex traits such as flavor. This project uses carrot as a model for developing screening methods for germplasm collections combining limited phenotyping with genomic prediction. The project will also use carrot and tomato to test methods of characterizing flavor using chef's assessment along with quantitative metrics and will investigate the underlying genetic architecture of this trait in carrot. The final objective of this project is to engage farmers, chefs and local food consumers in plant breeding for local food systems.

Grazing Management of Kernza® Intermediate Wheatgrass as a Dual Purpose Crop

Researcher: Valentin Picasso (UW-Madison Department of Agronomy, (608) 422-9611, picassorisso@wisc.edu)

Description: Kernza ® Intermediate wheatgrass *(Thinopyrum intermedium)* is a perennial cool-season forage grass that has been bred for large seed size and yield, becoming the first perennial grain crop in the US. Kernza production has great potential to improve agricultural sustainability compared to annuals because its extensive root systems reduce soil erosion and nutrient leaching, while simultaneously increasing farmer incomes due to decreased annual inputs and costs. Because intermediate wheatgrass grain is harvested in mid-summer, there is potential to harvest or graze its forage in the spring and fall, but little is known about the impact of grazing timing on grain and forage production. Therefore, our objectives are to measure: 1) intermediate wheatgrass grain yields after being grazed in spring, fall, or both seasons; and 2) forage yield, forage quality, and animal performance from grazed intermediate wheatgrass. Improved Kernza® seeds were planted for experiments at four organic and conventional farms in Minnesota and Wisconsin, and at two university research farms (UMN-Morris and UW-Lancaster). Farmers will learn how to profitably manage intermediate wheatgrass for forage and grain production. This dual purpose crop can be especially relevant for organic systems, because of the high potential to control weeds.

Principles for Transitioning to Organic Farming

Researcher: Michelle Miller (UW-Madison Center for Integrated Agriculture Systems, (608) 262-7135, mmmille6@wisc.edu)

Description: The project team, led by the University of Minnesota and in partnership with the Midwest Organic and Sustainable Education Services (MOSES) and Oregon State University, is designing a series of online, interactive educational modules with a focus on the fundamentals of organic agriculture and how to transition to organic farming for agronomic and selected horticultural crops in the Upper Midwest region. These e-learning materials, along with decision case studies, are for use as part of workshops, classes and training sessions. Decision case studies focus on actual situations and dilemmas facing organic producers in the Upper Midwest region. Students become active participants by considering the farmer's dilemma to make their own decision for that situation. The case studies are for use by educators in classrooms and workshops.

Appendix C: Resources and organizations

College and university resources

Lawrence University, Appleton
Jeff Clark
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sustainablelawrenceuniversitygardens.wordpress.com

Lawrence University offers a course in sustainable agriculture that addresses the state of modern agriculture in the U.S. and the world. Students identify social, economic and environmental problems with current systems of agriculture, and explore viable solutions to these problems. The course includes hands-on instruction at the university's organically managed garden.

Northeast Wisconsin Technical College, Green Bay
Valerie Dantoin, faculty, Sustainable Food & Ag Systems
valerie.dantoin@nwtc.edu
920-498-5568
www.nwtc.edu/programs/fields-of-interest/agriculture-food-and-natural-resources/program-details/sustainable-food-and-agriculture-systems

NWTC offers a certificate in Organic and Sustainable Agricultural Practices comprised of eight different courses developed by professional educators and farmers. Individuals can choose among the courses.

Northland College, Ashland
academics.northland.edu/growing-connections

Growing Connections is a nine-course sequence that focuses on the history, theories and practices of sustainable agriculture. Student participants work closely with faculty mentors and regional farmers in classrooms, labs and fields to develop a comprehensive understanding of the role that agriculture plays in the lives of individuals and their communities.

UW-Extension
Erin Silva, State Specialist
Organic and Sustainable Agriculture
emsilva@wisc.edu
608-890-1503
www.uwex.edu and www.uworganic.wisc.edu

University of Wisconsin-Extension provides education and resources to students, business owners, farmers, community leaders, youth and families in our state. The University of Wisconsin Organic and Sustainable Agriculture Research and Extension program strives to support organic farmers through its research and outreach efforts.

UW-Fox Valley, Menasha
Gregory Peter, Sociology
greg.peter@uwc.edu
920-832-2655
uwfox.uwc.edu

UW Fox Valley's experiential learning opportunities provide students with opportunities to get involved in local and organic food events and resource preparation, community garden projects and school food and waste management, as well as a number of non-agricultural sustainability projects.

UW-Madison, Agroecology Master's Program
Alan Turnquist
alturnquist@wisc.edu
608-890-3917
www.agroecology.wisc.edu

Agroecology at the University of Wisconsin-Madison aims to train analysts and researchers in a broadened vision of the possibilities of agriculture, including organic agriculture. Students can choose a public practice (project oriented) or research (thesis oriented) option for their master's degree work.

UW-Madison, Center for Integrated Agricultural Systems (CIAS)
Michael Bell
michaelbell@wisc.edu
608-262-5201
www.cias.wisc.edu

CIAS creates flexible, multidisciplinary research and education/training projects with the goal of learning how particular integrated farming systems, including organic, can contribute to environmental, economic, social and intergenerational sustainability.

UW-Madison, F.H. King Students for Sustainable Agriculture
fhkingstudents.wixsite.com/fhking

F.H. King Students for Sustainable Agriculture is focused on establishing the connection between the land, food and community. The organization has a one-acre, organically managed, student-run farm where volunteers and students gain hands-on experience in small-scale sustainable agriculture. F.H. King also holds free educational workshops and events for the UW-Madison campus community.

UW-River Falls, Sustainable Agriculture Program
William Anderson
william.anderson@uwrf.edu
715-425-3989
www.uwrf.edu/PES/SustainableAgOption.cfm

UW-River Falls offers a sustainable agriculture option within its Crop and Soil Science degree. Courses developed for the program address environmental sustainability, organic agriculture, rural sociology, integrated pest management, sustainable agriculture law and sustainable animal production. The University of Wisconsin-River Falls also has an online Sustainable Management program geared toward providing participants with a broad understanding of the intersections among business, natural science and social systems. Students may secure a professional certificate and a bachelor of science degree, as well as a fruit and vegetable sustainable systems option within the horticulture major.

UW-Stevens Point, Students for Sustainability
800 Reserve Street, Stevens Point 54481
spin.uwsp.edu/organization/SFS

The purpose of the Students for Sustainability is to create a means for UWSP students to experience, explore, share, and learn about issues relating to sustainable agriculture and community development.

State and federal agencies

USDA Farm Service Agency (FSA)
State office: 608-662-4422
www.fsa.usda.gov

FSA administers federal farm commodity, crop insurance, credit, environmental, conservation and disaster assistance programs to both organic and nonorganic producers nationally. FSA's Non Insured Assistance Program, for which organic farmers are eligible, provides insurance for a wide range of crops.

USDA Natural Resources Conservation Service (NRCS)
State office: 608-662-4422
www.wi.nrcs.usda.gov

Wisconsin NRCS provides technical assistance to land users and managers to assess environmental risk and develop conservation plans. NRCS provides cost sharing for conservation practices, including organic transition plans and a special sign-up for organic farmers, through the Environmental Quality Incentives Program (EQIP) and offers incentive payments to farmers who have installed a high level of conservation protection through the Conservation Stewardship Program (CSP).

Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)
Angie Sullivan, Agricultural Program Specialist
angie.sullivan@wi.gov
608-224-5095
datcp.wi.gov

The DATCP's Division of Agricultural Development provides farmer, business, and market development support to grow and improve Wisconsin's position as a competitive player for organic products. DATCP's Organic Agriculture program administers the USDA organic certification cost share program, coordinates the Wisconsin Organic Advisory Council, and provides technical assistance to businesses across the agricultural supply chain interested in organics.

Nonprofit organizations

American Pastured Poultry Producers Association (APPPA)
grit@apppa.org
888-66-APPPA (2-7772)
www.apppa.org

The American Pastured Poultry Producers' Association (APPPA) is a nonprofit educational and networking organization dedicated to encouraging the production, processing, and marketing of poultry raised on pasture. Membership in APPPA includes a bi-monthly mini-magazine dedicated to pastured poultry.

Central Rivers Farmshed
www.farmshed.org

Central Rivers Farmshed members are committed to making central Wisconsin a renowned local food community. Farmshed works to expand the connection between local residents and their food, and provides opportunities for participation, education, cooperation and action to support a local food economy in central Wisconsin.

Community Groundworks (Troy Gardens)
troyfarm@communitygroundworks.org
608-213-5309
www.communitygroundworks.org

Community GroundWorks manages 26 acres of open space. Their programs fulfill the goals of developing the land in a sustainable manner, improving food security for Madison's north side residents and providing educational programs on gardening, natural areas restoration, food preparation, nutrition and environmental education. They offer internships in sustainable and organic agriculture.