ORGANIC GRAIN PRODUCTION IN THE UPPER MIDWEST

STATUS AND PROSPECTS

July 2017

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Executive Summary

The United States is the largest producer and exporter of corn in the world. In spite of that, the U.S. imported nearly half its organic corn supply in 2016. The domestic shortfall for organic soybeans was even greater, with approximately 80% of the U.S. organic soybean supply being imported in that same year.

Concerns have been raised about the integrity of organic certification of products from other countries. This is an important issue – consumer confidence in organic certification is critical for this rapidly growing market. Questions also exist about why the U.S., a country that committed 180 million acres (or more than 55% of total harvested acres) to corn and soybeans in 2016, needed to import more corn and soybeans.

Organic grain production offers an effective way to address many of the environmental problems caused by conventional farming practices in the U.S. Yet, in spite of rising consumer demand for organic food, failing economics for conventional grain production, and mounting environmental problems linked to farming throughout rural America, organic grain farming remains only a small, slowly growing, fraction of overall production.

This report analyzes prospects and challenges for significantly expanding organic grain production in the Upper Midwest. [1] An argument is made that, from a societal point of view, the question of organic expansion is not necessarily one of "which crop is more profitable?" Instead, it is one of "what do we want from vast expanses of rural landscapes?"

Background

Earlier this year (2017), a report by CoBank, a national cooperative bank serving agriculture and other industries across rural America, reported that:

> *Imports of organic grains, particularly corn, surged in 2016 to meet the burgeoning U.S. demand for organic food products. Organic corn imports more than doubled from 2015 to 2016 and accounted for nearly one-half of the U.S. organic corn supply, the report said. The domestic shortfall for organic soybeans was even greater, with roughly 80% of soybeans supplying the U.S. organic market imported in 2016.*[2]

Much of the media attention resulting from the CoBank report has centered on the issue of organic integrity; that is, can products from China, India, and several countries in Eastern Europe be trusted to follow the exacting standards demanded of organic farmers in the United States?[3] This is a serious

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[1] The term, "Upper Midwest" refers to the 12-state USDA-defined North Central Region — Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin. The term "organic grain" as used here refers to corn, soybeans, and "small grains" such as wheat, barley, and oats produced in accordance with USDA National Organic Program standards and certified through this or a recognized comparable program from another country.

[2] Demaree, Holly. "CoBank: Rising demand for organic and non-GMO grains outpaces U. S. production." *World-Grain.com*. 2/22/2017

[3] Bunge, Jacob. "U.S. appetite for organic food prompts jump in grain imports; farmers cry foul." *Wall Street Journal*. February 21, 2017. See also: Meersman, Tom. "Organic farmers worried about possible fraudulent grain imports."

issue. Rising imports, combined with a strong dollar, are resulting in unsustainably low prices organic farmers receive for their grains. Furthermore, if consumer confidence in organic certification is undermined by suspicious imports, the entire organic market could be adversely affected.

There are other reasons, most of them environmental, to be concerned that our domestic organic grain production is lagging demand. Organic grain production offers an effective way to address many of the environmental problems caused by conventional farming practices. Yet, in spite of rising consumer demand for organic food, failing economics for conventional grain production, and mounting environmental problems linked to farming throughout rural America, organic grain farming remains only a small, slowly growing, fraction of overall production.

What does it mean to say food is "organic"?

According to the National Organic Program (NOP), the USDA's National Organic Standards Board determined a national standard that organic food must be produced without the use of conventional pesticides, petroleum-based fertilizers, sewage-sludge-based fertilizers, herbicides, genetic engineering (biotechnology), antibiotics, growth hormones, or irradiation. Animals raised on an organic operation must meet animal health and welfare standards, not be fed antibiotics or growth hormones, be fed 100-percent organic feed, and must be provided access to the outdoors. Land must have no prohibited substances applied to it for at least three years before the harvest of an organic crop. The NOP states that all farms and handling operations that display the "USDA Organic" seal must be certified organic by the state or by a private agency, accredited by the USDA, to ensure the NOP standards are followed.

Source: Directly quoted from: USDA. Certified Organic Survey 2015 Summary. September 2016.

Environmental Advantages of Organic Grain Production

When consumers think of organic foods, they naturally think of those they see in grocery stores and food co-ops: fruits, vegetables, bakery items, dairy products, and meat. While some so-called "food grade" organic grain production is used to make bread, corn chips, and tofu, most of the organic grain produced in the United States is used to feed organic livestock. Put another way, the majority of organic acres in the United States are devoted to production of crops consumers never see, that is, feed for animals that provide dairy products, eggs, and meat.

Debates on health consequences of eating organic food are, of course, centered on those foods directly consumed by humans. When it comes to the environment, however, the number of acres devoted to organic production is the primary consideration. This is why a focus on organic grains and other animal feeds is so important. For example, in 2015, there were roughly eight times as many acres planted to organic field crops as to organic vegetables, potatoes, and melons combined.[4]

StarTribune. March 2, 2017 and Whoriskey, Peter. "The labels said 'organic.' But these massive imports of corn and soybeans weren't." *Washington Post*. May 12, 2017.

[4] USDA. NASS. Certified Organic Survey: 2015 Summary. September 2016.

The environmental advantages of organic grain production arise in several important ways.[5] First, and most easily understood, is the prohibition against toxic chemicals and GMO varieties, some of which have "built in" insect toxicity. The simplest and most effective way to prevent harm to pollinators, other wildlife, and humans from using farm chemicals and GMOs is to not use them. Second, the prohibition of petroleum-based fertilizers greatly reduces the possibility of nitrate and other pollution of rural water sources. Third, crops such as corn and soybeans are typically grown in "rotation"; that is, in a sequence of different crops over a period of several years. For example, an organic farmer in the Midwest might grow corn one year on a parcel of land, soybeans the next, wheat or barley the third, hay in the next two years, then repeat the cycle.

The so-called "rotation crops," especially hay and pasture, provide biodiversity and habitat completely lacking in conventional corn-soybean production systems.

The positive effects organic production has on water quality are particularly relevant in the Upper Midwest. Nitrate pollution from conventional fertilizer use has reached unhealthy levels in water sources throughout the region, with thousands of wells polluted in areas such as Iowa and southern Minnesota. This problem is illustrated by a lawsuit in Des Moines that has been particularly newsworthy.[6]

Research at Iowa State University[7] has found that organic farming can reduce nitrate pollution by as much as 50%. A commentary in the *Des Moines Register*[8] about the Iowa study suggests that there are two primary reasons organic corn and soybean systems leach about half as much nitrate as the conventional system. First, perennial crops such as alfalfa and forage grasses are normally part of a crop rotation in organic systems. These perennials have live roots year round and thus can provide protection against the leaching of nitrate during periods when annual crops would not. In addition, perennial crops can actually uptake and recycle nitrate.

Second, synthetic mineral forms of nitrate used in conventional agriculture are highly water soluble and susceptible to leaching as a result of rain or other water applications. Certified organic systems do not allow synthetic nitrogen application. Thus, organic farming systems typically supply nitrogen to the soil through legume crops in the rotation process or through the application of compost or manure. These organic forms of nitrogen are less subject to leaching.

Finally, special attention must also be paid to soil conservation and soil health. Both are better fostered by organic farming practices. Again because of rotation requirements, fewer acres are devoted to "row crops" like corn and soybeans that, by their nature, leave soil bare and subject to wind and water erosion through most of the year. Also, using animal manure and plowed-down hay and pasture crops in the organic nutrient plan improves soil health and structure in ways that conventional fertilizer regimes cannot.

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[5] The videos at www.OrganicTheRealNatural.com provide examples of organic grain farmers providing environmental benefits as part of food production.

[6] For example, see: *Iowa's Nasty Water War,* Politico Magazine, http://www.politico.com/magazine/story/2016/01/iowas-nasty-water-war-213551

[7] Cambardella, C., K. Delate and D.B. Jaynes. Water quality in organic systems. *Sustainable Agriculture Research*: Vol. 4, No. 3; 2015.

[8] Thicke, F., M. Smith and P. Mugge. "Organic farming can cut nitrate leaching in half." *Des Moines Register*. December 24, 2015.

Organic Grain Production in the Upper Midwest

Table 1 shows that the 12-state North Central Region has 38% of the total certified organic farm operations, 31% of the organic crop acres, 9% of the pastureland and 22% of the total organic acreage in the U.S. The organic totals in Table 1 are but a tiny fraction of those for conventional grains, however. For perspective, this region had about 140 million acres annually devoted to conventional corn and soybean production in 2015.

Table 1. North Central Region certified organic operations, crop and pasture acreage, 2015

State	*Certified farm operations*	*Crops (acres)*	*Pastureland (acres)*	*Total acres*
Illinois	218	22,275	2,959	33,605
Indiana	397	18,547	6,920	33,653
Iowa	840	90,310	14,398	112,785
Kansas	99	25,908	3,393	36,980
Michigan	483	66,369	5,592	83,619
Minnesota	659	125,780	21,086	169,094
Missouri	308	26,885	18,237	52,913
Nebraska	178	61,438	30,960	112,151
North Dakota	131	90,093	7,028	105,948
Ohio	608	53,022	16,473	79,763
South Dakota	99	32,109	13,710	80,789
Wisconsin	1,684	159,429	56,514	280,612
Total	5,704	772,165	197,270	1,181,912
U.S.	14,861	2,458,509	2,160,764	5,336,058
% of U.S. total	38.4 %	31.4 %	9.1 %	22 %

Source: USDA, NASS.

Table 2. North Central Region state major organic crop acreage and U.S. total, 2015

State	*Corn for Grain*	*Corn for Silage*	*Wheat*	*Oats*	*Barley*	*Soybeans*	*All Hay*
Illinois	9244	180	2945	2212	54	6682	3171
Indiana	5016	1337	259	429	77	2394	5986
Iowa	24553	635	2298	5795	1262	16255	11697
Kansas	3736	0	15167	179	522	1100	5388
Michigan	12077	421	4241	669	165	7085	5078
Minnesota	21750	3945	4787	4064	2894	10546	23077
Missouri	2755	378	2133	227	72	562	2289
Nebraska	8475	0	18709	1759	332	4857	11378
North Dakota	2416	0	16753	6424	1905	3177	7224
Ohio	8222	1756	3078	1390	330	5643	11771
South Dakota	4577	0	9013	3354	392	3903	12194
Wisconsin	26322	6708	3480	5751	4177	7691	37210
Total	129143	15360	82863	32253	12182	69895	136463
US	166841	35149	301950	39647	50826	140345	430331
% of Total	77.4	43.6	27.4	81.3	24.0	49.8	31.7

Source: USDA, NASS.

Table 2 reports data for the 12-state region by state for major organic cash crops. The 12-state region has 77.4% of the nation's organic corn grain acres, 43.6% of corn for silage acres, 27.4% of wheat (all types), 81.3% of all the oat acreage, 24% of the barley, 49.8% of soybean acreage and 31.7% of all hay.

The financial analysis of organic grain production in the Upper Midwest presented here is based upon data obtained from the Center for Farm Financial Management at the University of Minnesota. FINPACK is a comprehensive farm financial planning and analysis software system developed and supported by the Center. The Center collects data contributed by farm management associations throughout the Upper Midwest that use FINPACK as their farm business analysis and summary program. The Center's database summarizes actual farm data from thousands of agricultural producers throughout the Upper Midwest who use FINPACK for farm business analysis.

There are many more conventional than organic farms in the Center's database. Nonetheless, the process in which farmers work through farm management associations to report data assures the accuracy of both sets of records. Each has a trained leader qualified to advise on data reporting and analysis. Furthermore, the financial numbers presented here were restricted to those reflecting cash rent land (as opposed to owned land). This provides for the fairest comparison between organic and conventional farms. All data reported are for 2015.

As stated, the types of crops grown by organic farmers change relatively often during a multi-year production cycle. Conventional farmers, on the other hand, use rotations that are far more limited. Corn in one year, followed by soybeans in the next, then back to corn is typical. We also see so-called "continuous corn" in which corn is planted in several successive years. Because of this, the net returns for a wider variety of crops need to be included in an analysis of returns to organic farming and in comparing those returns to conventional farming.

Table 3 compares net returns for organic and conventional farming for five crops: corn, soybeans, oats, alfalfa hay, and mixed hay. Wheat is another likely small grain for analysis here, but there are insufficient data to include it. An organic farmer growing corn and soybeans would likely grow at least some of the other three crops to meet rotation requirement. On the other hand, it is uncommon to find any of those other three crops growing on a conventional corn/soybean farm.

Table 3. Net returns over labor and management, $/acre, 2015

Crop	*Organic*	*Conventional*
Corn	531.41	-57.48
Soybeans	90.26	-2.39
Oats	157.56	-10.61
Alfalfa Hay	216.17	188.92
Mixed Hay	92.65	-11.93

Source: University of Minnesota. Center for Farm Financial Management.

Notice that returns per acre are universally higher, and often much higher, for organic production than for conventional production. In fact, several years of low prices for conventional grains have led to negative returns for many conventional crops.

Table 4 tells a commonly-accepted story of lower yields with organic production being more than offset by higher prices. Grain prices for organic production, in particular, can be on the order of three times higher than those for conventional production. The concern organic farmers have for import competition is underscored by the data in Table 4.

By early 2017, the farm gate prices for both organic corn and organic soybeans had fallen dramatically from the 2015 levels reported in Table 5: corn was $2.00 per bushel lower and soybeans were $5.00 per bushel lower.[9] Most of the economic advantage for growing organic corn and soybeans is erased by these lower prices.

Table 4: Yields (units/acre) for organic and conventional grain producers in the Upper Midwest, 2015.

Crop	*Organic*	*Conventional*
Corn (bushel)	124	187
Soybeans (bushel)	27	48
Oats (bushel)	68	82
Alfalfa Hay (ton)	4.4	4.4
Mixed Hay (ton)	3.2	2.1

Source: University of Minnesota. Center for Farm Financial Management.

Table 5: Prices ($/unit) for organic and conventional grain producers in the Upper Midwest, 2015.

Crop	*Organic*	*Conventional*
Corn (bushel)	10.11	3.48
Soybeans (bushel)	22.88	8.50
Oats (bushel)	6.57	2.39
Alfalfa Hay (ton)	151.45	138.18
Mixed Hay (ton)	143.49	71.12

Source: University of Minnesota. Center for Farm Financial Management.

Revenues from crop sales are significantly different for organic grain farmers than for conventional farmers. Differences in production expenses, however, are not as large (Table 6). Notice especially that production costs for organic corn are virtually the same as those for conventional corn.

Table 6: Total direct and overhead expenses, $/acre 2015

Crop	*Organic*	*Conventional*
Corn	721.06	711.49
Soybeans	526.30	417.77
Oats	323.47	254.72
Alfalfa Hay	429.71	422.04
Mixed Hay	336.51	150.47

Source: University of Minnesota. Center for Farm Financial Management.

[9] USDA. Bi-Weekly National Organic Comprehensive Report. Thursday, March 2, 2017-Wednesday, March 15,2017.

Even though costs of production can be relatively close for organic and conventional production, the mix of expenses making up the total is quite different.[10] For example, conventional corn farmers spend more on chemicals and GMO seed varieties not permitted in organic farming. On the other hand, costs for operating equipment and for labor are generally higher with organic corn production. (Table 7)

Table 7: Selected corn production expenses, $/acre 2015

Expense item	*Organic corn*	*Conventional corn*
Fuel and oil	42.14	23.05
Repairs	77.15	38.57
Labor & mgt. charge	72.36	47.02

Source: University of Minnesota. Center for Farm Financial Management.

The reason for these differences can be said in one word: "weeds." Conventional farmers control weeds with chemicals that, as a rule, require a single pass through a field to apply the chemical. Organic farmers cannot use those chemicals. Instead, they make several passes through the field, often beginning before planting and lasting well into the time the corn plant has emerged and is gaining height. With each pass, the tractor is pulling one or more of several weeding devices such as cultivators, rotary hoes, and flame weeders. The more time a farmer spends on the tractor, the higher the costs for fuel, repairs, labor, and management. In addition to frequent use of farm equipment to fight weeds, the multi-crop rotation is itself part of a strategy to keep fields relatively clean. Hay crops, in particular, break up the life cycle of weeds common in corn and soybean fields. But hay and other such rotation crops are generally harder to market and less profitable.

The conventional farmer uses commercial fertilizer products that are easily applied and quickly released to crops. The organic farmer, on the other hand, cannot use most commercial fertilizers and therefore faces greater challenges in assuring plants have the necessary nutrients to reach their full yield potential. Corn is the best example--its nutrient requirements, especially for nitrogen, substantially exceed those of other crops considered here. Many are surprised to see that the nutrient costs to grow corn on an organic farm are within a few dollars per acre of those for a conventional farm. In 2015, the organic corn fertilizer cost was $127.99 and that for conventional corn was $137.09. But the similarity stops with the numbers. The conventional corn farmer is applying commercial nitrogen and other nutrients that release quickly and in predictable ways. Not so for the organic farmer.

The organic farmer is most likely applying animal manure to corn. The nutrient content of animal manure is more variable and difficult to assess. Furthermore, nutrients in animal manure are not released in such a uniform and predictable as those from commercial fertilizer. The organic farmer's nutrient challenge is compounded by the use of so-called "green manure," that is, nutrients that are introduced into the soil when a previous year's crop is plowed into soil scheduled for corn production in a later year. Green manure is notoriously difficult to assess in terms of nutrient content and release patterns.

[10] The discussion that follows centers on corn, but similar statements can be made for other crops grown by organic farmers.

Apart from these cost differences, organic grain farmers generally farm a smaller amount of land than do their conventional counterparts. (Table 8) This is sometimes because organic farmers are new to farming and have trouble financing large land purchases. But no matter the financial status or experience of a farmer, organic grain farming is more management-intensive and does not lend itself as well to the "get big or get out" philosophy that has dominated conventional grain farming for decades.

Table 8: Farm size and land tenure for organic and conventional farmers

Crop acres	Organic	Conventional
Total crop acres	247	943
Crop acres owned	92	273
% of acres owned	37%	29%

Source: University of Minnesota. Center for Farm Financial Management.

Smaller farms are more often owned by the farmer operating the farm. Very large farms, on the other hand, are usually stitched together with several rental arrangements added to an owned "home farm" that is an increasingly small percentage of total land farmed. In addition, the organic farmer must operate for three years in certain ways to be sure the land can be certified for organic production; the conventional farmer faces no such restrictions. As a result, the organic farmer is less likely to use rental land that does not include an exceptionally long lease arrangement.

Factors Affecting Expanded Organic Production

Two recent statements from the Organic Trade Association underscore how much organic food has grown from a niche market to a major consumer grocery segment:[11]

- In the first comprehensive look at organic purchases by households on a state-by-state level, the nationally representative Nielsen study of 100,000 households conducted in 2015 and 2016 reported that more households than ever bought organic food on a regular basis throughout 2016. The national average climbed 3.4% from 2015 to 82.3%
- Organic food sales in the United States now total around $40 billion annually, and account for around 5% of total food sales in this country. According to the Organic Trade Association's 2016 U.S. Organic Industry Survey, total organic food sales in 2015 were $39.7 billion, up 11% from the previous year.

Major players in the food system are at various stages in development for major organic consumer product lines and launching programs to increase organic acres in production. In spite of all this encouraging news for the organic food sector as a whole, crop acreage of organic corn and soybeans is not keeping up with domestic demand. Slow growth coupled with rising imports clearly means there is room in the market for more domestic production of organic grain crops in the United States.

Nonetheless, the economic advantage shown for organic grain production, especially when conventional crop prices stagnate at very low levels, is not attracting many grain farmers to switch to

[11] Organic Trade Association. "New state data shows organic now in the kitchens of over 80 percent of U.S. households." March 23, 2017.

organic methods. Why is this?[12] The risk associated with the three-year transition period required to certify land as organic is among the factors contributing to slow growth.

The downward pressure on organic prices due to the amount of imported grain coming into the U.S. also causes concern among farmers contemplating conversion to organics. Still another worry comes from organic grain shipments being turned away by buyers due to contamination from GMO crops grown in neighboring fields; one study put such losses at $4,500 per rejection.[13]

A farmer considering organic grain production must also recognize that, of all farmers in the United States, organic grain farmers are among the most vulnerable to policy changes. Organic livestock are exclusively fed products from organic grain farms for one simple reason: the USDA organic standards require that it be so. "Relaxing" or out-right elimination of that requirement does away with higher prices for organic production and, with it, the principal economic incentive to convert from conventional production. This situation adds urgency to calls for expanded production of organic feed grains; otherwise, the shortage can be used as a reason to change the organic feed standard in ways that will be devastating to acreage expansion plans among new farmers and, worse yet, the economic viability of farmers now producing organic grains. Less devastating, but still significant, are various retail labels on livestock products such as "cage-free" and "grass fed" that can be used to side-step the USDA organic standard.

Finally, agribusiness is for the most part not set up to support organic grain farming. At the extreme, a multinational chemical and GMO-seed company may not sell anything currently approved for organic farming. Large equipment companies will find no markets for specialized spray equipment and limited applications of machines that have been designed for the country's largest farming operations. The influence of such interests in preserving conventional farming, as lobbyists in Washington and as supporters of University-level research, is both pervasive and considerable.

Bottom Line

While all of these concerns, and more, are legitimate, a larger perspective is needed to fully understand the issues in transition to large-scale organic grain farming. Simply comparing an acre of organic grain to that of conventional grain does not tell the whole story. An organic grain farm is fundamentally different from its conventional counterpart in important ways. For one thing, it typically grows from four to six crops in rotation instead of the two that dominate today's Corn Belt agricultural scene. For another, organic grain farms are typically much smaller than their conventional counterparts because of the higher management requirements for organic grain farming. Third, an organic farm is typically an island in a sea of conventional production, surrounded by neighboring farms using prohibited chemicals and planting GMO varieties.

Because of crop rotations used in organic grain production, an organic Corn Belt would be as much a hay and pasture belt as it would be one devoted to corn and soybeans. More animals would be fed on farm pastures instead of in distant factory feeding operations. Concerns for GMO contamination

[12] For a comprehensive treatment of issues concerning growth in organic farming, see: National Organic Coalition. Expanding production in the United States: challenges and policy recommendations. Draft Version. November 2016. http://www.nationalorganiccoalition.org/LiteratureRetrieve.aspx?ID=135516

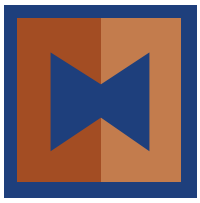
[13] Reed, Geena. The heavy price tag of GMO contamination. Food & Water Watch. Sept. 22, 2015.

would be reduced or eliminated as GMO crops were phased out of production in organic areas. Soil health and water quality would improve in ways that simply cannot be accomplished with current conventional farming methods. Pollinators and other wild species would thrive in the biodiverse environment or an organic Corn Belt. And rural communities would be invigorated as farm size became smaller and more people were required in farming operations.

From a societal point of view, the question of organic expansion is not necessarily one of "which crop is more profitable?" Instead, it is one of "what do we want from vast expanses of rural landscapes?"

Further Reading

Bobbe, John. Marketing Organic Grains: A Farmer's Guide. Levins Publishing. 2015.
www.MarketingOrganicGrain.com



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