The Economic and Financial Impacts of Organic Production in Canadian Agriculture

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Appendix 1: Organic Task Force Technical Report: Agricultural Economics

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Summary

Organic agriculture may be more profitable than conventional farming, with lower yields, similar costs, and higher prices. This presents an opportunity to farmers to increase their long-term net returns. However, the 3-year transition to organic farming, with lower yields and without price premia can be challenging. Given the co-benefits, it may be beneficial to support organic farming at the national level. This report evaluates the average costs and net returns of organic farming compared to conventional in Canada by crop and for four case study rotations using enterprise budgeting techniques.

The study finds that, for most examined crops, the long-term returns to organic farming are positive, but the transition is costly (return values are negative). Specifically, corn is a high enough yielding crop that many prices are profitable, giving a positive net return even during organic transition. Yields of some crops, including oat, pea and apple have relatively low expected organic yields. This makes the organic production less profitable than conventional and therefore makes long-term net return negative for these specific crops. The costs of the transition for barley, lentil and chickpea make it so that 10-year long-term net returns are close to zero. However, barley, lentil and chickpea do have higher organic returns than conventional.

From the case studies, long-term organic net returns are positive in rotation, even with green manure or fallow years, with short-term negative transition costs.

1. Introduction

Agriculture contributes roughly 8% of Canada's annual greenhouse gas (GHG) emissions, including 76% of N_2O emissions (ECCC, 2024). Organic crop agriculture has lower emissions from chemical application, particularly N_2O emissions which would otherwise be released from N fertilizer use. However, organic agriculture frequently substitutes chemicals for machinery and labour. On an area basis, this often results in lower emissions but has an ambiguous overall effect on emissions per unit production. Regardless, organic production appears to result in enhanced non-emissions outcomes, or co-benefits, including lower toxicity, water pollution, and energy use (Boschiero et al., 2023), in addition to soil quality and biodiversity. Organic agriculture also presents lower yields, but with significantly higher prices. This makes the overall effect of both emissions and economics unclear, with differences in different agricultural sectors.

Many publications on the topic agree that organic agriculture results in lower crop yields (Boschiero et al., 2023; Kniss et al., 2016; Smith et al., 2020). For different categories and timeframes, this effect can be much different (Rosa-Schleich et al., 2019). Furthermore, farming systems in Africa may show increases in yield (Schader et al., 2021). Organic yields overall may be 10–18% lower, globally (Crowder & Reganold, 2015).

Costs of organic agriculture are generally perceived to be lower, as input costs are greatly lowered. However, increases in labour requirements and tillage, can make costs similar or higher. Specifically, labour costs may be 7% to 13% higher, globally (Crowder & Reganold, 2015).

Organic agriculture is generally perceived to be more profitable than conventional agriculture, given the price premium paid for organic crops (Crowder & Reganold, 2015; Grovermann et al., 2021; Khanal et al., 2018; Reganold & Wachter, 2016; Rosa-Schleich et al., 2019; Schader et al., 2021; Smith et al., 2020). There are counter examples that show losses to organic agriculture, however, including in Brazil (Froehlich et al., 2018), China (Meng et al., 2017), and in underdeveloped organic markets in Lebanon (Abebe et al., 2022). The lowered yields and unclear changes in costs are paid for by the increase in price. However, the transitional period can be difficult, with lower yields and prices. For example, net present values without price premiums range from −27% to −23%, and from 22% to 35% with (Crowder & Reganold, 2015). Breakeven price premiums may be as low as 5% to 7%.

Given that organic agriculture is generally expected to be lower emissions, with higher profit, the cost of transition is an important aspect that influences adoption. Therefore, the purpose of this report is to examine the differences in financial returns between

organic and conventional production by crop, and for select case study rotations to estimate the cost of the organic transition.

2. Methods and Data

The differences in financial performance between organic and conventional crops is calculated using representative farm budgets by crop. These budgets are then used to establish 3-year transition (organic yield and conventional price) and 10-year long term net returns. For grain crops, regionality is inherent in crop type. For example, spring wheat is primarily grown on the Prairies and in Quebec, while winter wheat is primarily grown in Ontario. For Canada wide analysis, most wheat is spring wheat, and most soybeans come from Ontario.

The yields of conventional crops were taken from Statistics Canada data, with organic yield coefficients established from multiple sources in Bouwman (2024).

Conventional prices for grain crops were taken from public sources. Corn and soybean prices are 1-year averages (June 2023 – July 2024) from the Grain Farmers of Ontario (GFO, 2024). Wheat (spring), canola, barley, oat, lentil, chickpea, and pea prices are 1-year averages (August 2023 – August 2024) from Saskatchewan's Dashboard (Saskatchewan, 2024a). Rye prices were derived from the Saskatchewan Crop Insurance Corporation (SCIC, 2024). Flax prices were sourced from the Organic Grain Hub (OGH, 2024). Horticultural prices were established differently for each crop, with potato (Table: 32-10-0077-01) and lettuce (Table: 32-10-0456-01) prices from Statistics Canada. Apple (OMAFRA, 2024a), blueberry (OMAFRA, 2024a), and spinach (OMAFRA, 2024b) prices were derived from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Carrot prices were derived from University of Georgia Extension (Fonsah and Shealey, 2022). Organic ratios were established using price data from OrganicBiz (2024) for grain crops. Horticultural crop price ratios were assumed to be double (200%) of the conventional prices, the average established from OrganicBiz for grain crops. Table 1 lists conventional prices, organic price ratios, and resultant organic prices.

Table 1: Conventional and organic crop prices in dollars per tonne with organic price ratio in percentage.

Crop	Conventional Price ($/t)	Organic Price Ratio (%)	Organic Price ($/t)
Wheat	313	192	603
Canola	616	200	1231
Barley	238	171	407
Oat	275	183	502
Rye	240	184	442
Flax	630	291	1831
Pea	432	200	864
Lentil	1268	264	3343
Chickpea	1086	257	2791
Corn	252	203	511
Soybean	634	221	1402
Potato	475	200	951
Carrot	992	200	1984
Lettuce	4336	200	8672
Spinach	2201	200	4402
Apple	1014	200	2028
Blueberry	7716	200	15432

3. Crop-based Organic vs. Conventional Production Economics

3.1 Grain Crop Budgets

Conventional and organic production costs were calculated by crop. Ontario organic and conventional crop budgets were used to calculate costs for barley, corn and soybean in Eastern Canada (OMAFRA, 2024a). Prairie flax, oat, pea, spring wheat, barley, and rye budgets were calculated based on organic and conventional crop budgets from Manitoba (Manitoba, 2024). Using the Manitoba organic budget as a guide for fertility and machinery versus chemical costs, Saskatchewan conventional crop budgets were adapted to organic for canola, chickpea, and lentil (Saskatchewan, 2024b). In this way, costs are determined by available data and applicable growing regions. Tables 3, 4, 5 and 6 contain conventional and organic crop budget comparisons by cost category for these crops.

The fertility costs from Manitoba (2024) consider the cost of growing a green manure, like alfalfa, sweet clover, or forage peas, without revenue in 1 of 4 growing years plus the cost of underseeding red clover in 1 of 4 years. The green manure cost is portioned into the assumed remaining rotation length, with the cost of underseeding divided by the frequency and rotation length, to estimate the fertility cost. In the case of a forage oat and vetch mix and red clover underseeding both in 1 of 4 years, this works out to $388/ha. For Alfalfa, it would be $373/ha. The annual cost of Alfafa production is $979/ha, with red clover underseeding estimated at $187/ha.

Table 3: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for spring wheat, barley and rye grown primarily in Prairie Canada.

	Wheat		**Barley**		**Rye**	
$/ha	ORG	CON	ORG	CON	ORG	CON
Operating Costs						
Seed & Treatment	149	84	93	72	74	163
Fertility/Fertilizer	388	406	388	330	388	499
Compost	39	0	39	0	39	0
Crop Protection	0	137	0	147	0	19
Fuel	103	113	103	122	103	101
Machinery Operating & Lease	62	62	62	62	62	62
Labour - Hired	64	13	64	13	64	13
Crop Insurance	145	26	62	40	38	38
Hail Insurance	23	31	23	31	23	31
Drying & Other Costs	44	44	44	44	44	44
Certification Cost	8	0	8	0	8	0
Land Taxes	43	43	43	43	43	43
Storage Costs	21	41	22	50	18	51
Interest on Operating	43	39	36	37	34	41
Total Operating	1133	1038	989	990	939	1105
Fixed Costs						
Land Investment Costs	240	240	240	240	240	240
Machinery Costs	213	213	213	213	213	213
Total Fixed	454	454	454	454	454	454
Owners - Labour & Living	128	64	128	64	128	64
Total Costs	1715	1556	1571	1508	1521	1623

Table 4: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for flax, oat and pea grown primarily in Prairie Canada.

	Flax		**Oat**		**Pea**	
$/ha	ORG	CON	ORG	CON	ORG	CON
Operating Costs						
Seed & Treatment	185	161	148	74	185	217
Fertility/Fertilizer	388	200	388	295	388	84
Compost	39	0	39	0	39	0
Crop Protection	0	95	0	56	0	182
Fuel	102	106	104	138	102	96
Machinery Operating & Lease	62	62	62	62	62	62
Labour - Hired	64	13	64	13	64	13
Crop Insurance	142	49	123	54	55	44
Hail Insurance	23	31	23	31	46	62
Drying & Other Costs	44	44	44	44	44	44
Certification Cost	8	0	8	0	8	0
Land Taxes	43	43	43	43	43	43
Storage Costs	8	16	39	77	12	31
Interest on Operating	44	32	42	34	40	34
Total Operating	1154	850	1129	921	1091	911
Fixed Costs						
Land Investment Costs	240	240	240	240	240	240
Machinery Costs	213	213	213	213	213	213
Total Fixed	454	454	454	454	454	454
Owners - Labour & Living	128	64	128	64	128	64
Total Costs	1736	1368	1711	1439	1673	1429

Table 5: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for canola, chickpea and lentil grown primarily in Prairie Canada.

	Canola		**Chickpea**		**Lentil**	
$/ha	ORG	CON	ORG	CON	ORG	CON
Operating Costs						
Seed & Treatment	210	232	135	153	67	77
Fertility/Fertilizer	388	330	388	61	388	56
Compost	39	0	39	0	39	0
Crop Protection	0	266	0	285	0	227
Fuel	130	65	127	63	110	55
Machinery Operating & Lease	67	34	53	26	59	30
Labour - Hired	106	53	100	50	106	53
Crop Insurance	74	37	120	60	87	44
Hail Insurance	35	35	35	35	35	35
Drying & Other Costs	13	13	8	8	11	11
Certification Cost	8	0	8	0	8	0
Interest on Operating	33	33	31	23	28	18
Total Operating	1104	1097	1045	765	939	605
Fixed Costs						
Land Investment Costs	220	220	184	184	218	218
Machinery Costs	192	192	150	150	169	169
Total Fixed	411	411	335	335	387	387
Total Costs	1515	1508	1379	1100	1326	993

Table 6: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for corn, soybean and barley grown primarily in Eastern Canada.

	Soybean		**Corn**		**Barley**	
$/ha	ORG	CON	ORG	CON	ORG	CON
Operating Costs						
Seed & Treatment	296	262	282	299	278	160
Fertility/Fertilizer	173	192	469	606	222	276
Herbicide & Insecticide	0	69	0	83	0	118
Tractor and Machine	297	118	255	215	207	178
Marketing Board	3	5	3	5	4	5
Production Insurance	103	34	103	50	29	29
Risk Management	6	8	12	19	25	31
Drying	0	0	179	268	0	0
Custom Work	0	110	0	76	0	110
Organic Certification	8	0	8	0	8	0
Trucking	26	35	86	129	32	39
Storage	22	32	22	107	22	0
Labour	63	26	59	44	45	35
Interest on Operating	41	37	61	78	59	54
Total Operating	1038	928	1540	1978	931	1036
Fixed Costs						
Machinery	241	63	173	132	148	136
Other Overhead	37	7	23	16	21	17
Total Fixed	278	70	196	148	168	153
Total Costs	1316	998	1737	2126	1100	1189

3.2 Horticultural Crop Budgets

Horticultural crop budgets for both organic and conventional production, especially for both simultaneously, are less well developed in the literature compared to grain crop budgets. Organic versus conventional production may also be significantly different, in the sense of scale and marketing. For example, an organic farmer may have 1 hectare of carrots, whereas a conventional farmer may have 50 hectares. An organic potato producer may be more likely to sell table potatoes, versus a conventional producer selling to processors. This makes variations in cost more extreme in some cases, as production systems are different, or overhead costs are higher for smaller operations on an area basis.

The potato budget was established using an irrigated conventional potato budget for Manitoba (Manitoba, 2024). The irrigation system was removed for the organic versus conventional comparison. The organic budget was adapted from the conventional by removing chemical costs and doubling non-chemical application machinery and labour. Organic certification costs as per the organic budgets were also added. Fertility costs were assumed to come from different sources but remain the same. This resulted in similar per hectare costs of production, shown in Table 7.

Table 7: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for non-irrigated potato.

	Potato	
$/ha	ORG	CON
Operating Costs		
Seed	882	1110
Fertilizer/Fertility	1536	1536
Herbicides	0	160
Fungicide & Insecticide	0	615
Fuel Costs-Field	333	270
Trucking Costs	668	668
Maintenance & Repairs	1549	1549
Custom Work & Rental	0	393
Hired Labour	2214	1107
Insurance	324	324
Utilities	168	168
Other Costs	299	292
Interest on Operating	399	410
Total Operating Costs	8372	8601
Fixed Costs		
Own Land Cost	483	483
Depreciation	1848	1848
Investment	537	537
Total Fixed Costs	2869	2869
Own Labour	554	277
Total Cost of Production	11794	11747

Apple and blueberry budgets were adapted from conventional Ontario horticultural budgets (OMAFRA, 2024a). For blueberry, the production system is closer to a local stand or pick-your-own, than for processing, although the stand maintenance costs have been removed. Organic adaptations to the budget include the removal of chemical applications, along with doubled machinery and labour requirements. As labour is a major part of this system, the relative cost of organic is large. The same adaptations were made to the apple organic versus conventional systems, with the organic system being lower density than the conventional system. As the chemical requirements for conventional apples are higher, the costs of production are closer. The costs of production for organic versus conventional blueberry and apple production are presented in Table 8.

Table 8: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for non-processing blueberry and medium (organic) versus high-density (conventional) apples.

	Blueberry		**Apple**	
$/ha	ORG	CON	ORG	CON
Operating Costs				
Hand Labour	58030	29015	27525	7489
Machine Operator Labour	832	832	4545	3017
Fertilizer/Fertility	1286	870	909	455
Chemical	0	1960	0	5036
Other	2858	2858	1092	3252
Containers	6462	6462	568	1989
Insurance	0	0	1707	2800
Fuel	1446	1446	6286	3482
Machinery Repair & Maintenance	314	314	2031	1211
Interest on Operating	1781	1094	3494	2212
Total Operating	73008	44849	48158	30942
Fixed Cost				
Depreciation	739	739	1460	1772
Interest on Investment	314	314	712	887
Cold Storage	655	655	655	0
General	3212	3212	3880	3880
Amortized Establishment	4970	3110	0	8632
Total Fixed Costs	9890	8030	6706	15170
Total Cost of Production	82898	52879	54865	46112

Carrot, lettuce, and spinach costs of production were more difficult to establish for any Canadian context with organic budgets being derived from small-scale production examples by Kwantlen Polytechnic University (Afeworki et al., 2015a; 2015b; 2015c). These budgets were updated for inflation from 2015 to 2024 using the Bank of Canada inflation calculator. For carrot, conventional production estimates were derived from University of Georgia Extension (Fonsah and Shealey, 2022) for a larger, more mechanized production system. The organic example has much higher overhead costs, being small-scale, whereas the conventional production system has higher post-harvest packaging requirements. The organic versus conventional carrot production budgets are presented in Table 9.

For spinach and lettuce, small-scale production is likely more common for both organic and conventional production. The differences in production cost at the small-scale were assumed to be zero, as chemical use likely roughly offsets labour. Spinach and lettuce budgets for organic production are presented in Table 10.

Table 9: Organic (ORG) and conventional (CON) production cost budgets in dollars per hectare for small-scale (organic) versus larger-scale (conventional) carrots.

	Carrot	
$/ha	ORG	CON
Operating Costs		
Seed	1236	1668
Fertility	124	1821
Weed & Disease Control	4863	3547
Lime	247	117
Land Preparation	1264	0
Machinery	104	386
Regular Labour	297	534
Irrigation	119	341
Harvest	1779	2495
Post-harvest	474	13101
Repair & Maintenance	3685	0
Interest on Operating	177	421
Marketing	4334	1561
Total Operating Cost	18703	25993
Fixed Costs		
Equipment	8753	2140
Overhead	11705	1212
Total Annual Fixed Cost	20458	3352
Total Cost	39160	29346

Table 10: Organic (ORG) serving also as conventional (CON) production cost budgets in dollars per hectare for small-scale lettuce and spinach production.

	Lettuce	**Spinach**
$/ha	ORG	ORG
Operating Costs		
Seed	91	52
Compost	99	49
Lime	74	37
Land Preparation	263	132
Planting	353	30
Pest Management	356	297
Irrigation Management	15	15
Harvest	178	534
Post-harvest	178	890
Repair & Maintenance	1198	1198
Fuel	57	29
Interest on Operating	24	27
Marketing	2193	690
Total Operating Cost	5079	3978
Fixed Costs		
Equipment	6005	6005
Overhead	5867	5867
Total Fixed Cost	11871	11871
Total Production Cost	16950	15850

3.3 Organic Transition and 10-year Return Outlook

Transitioning from conventional to organic production requires a 3-year period where it is assumed that the farmer receives organic yields and conventional prices. The transition cost is this lower yield and price compared to the conventional return. This transition can be considered costly and is a major barrier to organic production. However, long-term returns are often greater from organic. As such, the 10-year return to organic production, including the 3-year transition period, is also considered here. Given the yields in Bouwman (2024) and the prices and costs listed here, Table 11 calculates the transition costs and 10-year average net return of the transition from conventional to organic production for the crops examined in Table 1.

Table 11: Annual average transition (3-year) costs (organic yield and conventional price compared to conventional) and difference in long-term (10-year) net return of the transition from conventional to organic production for selected crops.

Crop	ORG Revenue ($/ha)	ORG Cost ($/ha)	ORG NR ($/ha)	CON Revenue ($/ha)	CON Cost ($/ha)	CON NR ($/ha)	Transition Cost ($/ha)	10-year NR Difference ($/ha)
Wheat	1,290	1,715	-476	849	1,556	-707	364	53
Canola	1,937	1,515	422	1,274	1,508	-233	313	365
Barley	904	1,571	-611	744	1,508	-764	246	33
Oat	1,109	1,711	-596	854	1,439	-584	516	-163
Rye	1,093	1,521	-428	780	1,623	-843	86	264
Flax	1,628	1,736	-108	737	1,368	-631	545	202
Pea	1,019	1,673	-655	894	1,429	-535	629	-273
Lentil	2,191	1,326	861	1,458	993	465	962	-11
Chickpea	1,861	1,379	479	1,270	1,100	171	827	-33
Corn	4,547	1,737	2,897	2,515	2,126	389	-156	1,802
Soybean	3,432	1,316	1,975	1,941	998	943	770	491
Potato	28,368	11,794	15,524	19,430	11,747	7,683	5,818	3,744
Carrot	60,775	39,160	21,857	40,517	29,346	11,171	19,823	1,534
Lettuce	136,888	16,950	120,524	97,777	16,950	80,826	29,040	19,076
Spinach	31,513	15,850	15,664	20,732	15,850	4,883	4,976	6,054
Apple	22,475	54,865	-32,182	20,810	46,112	-25,302	18,221	-10,282
Blueberry	243,831	82,898	160,933	121,915	52,879	69,036	30,019	55,322

4. Case Studies

4.1 Glenlea

The rotation at the Glenlea site differs between organic and conventional. Both rotations include wheat and flax, but conventional oat and soybean are replaced by alfalfa in the organic rotation. Yield information was sourced from Graves (2024). Conventional alfalfa prices were sourced from AFSC (2024) and doubled. Alfalfa costs are present in Table 12.1, adapted from Manitoba (2024). While the transition is costly, long-term net returns are higher for organic (Table 12.2).

Table 12.1: Organic production cost budgets in dollars per hectare for alfalfa in planting and secondary years.

	Alfalfa (Planting)	**Alfalfa (Year 2)**
$/ha	ORG	ORG
Operating Costs		
Seed & Treatment	37	0
Fertility/Fertilizer	0	0
Compost	39	39
Crop Protection	0	0
Fuel	84	42
Machinery Operating & Lease	62	31
Labour - Hired	64	32
Crop Insurance	0	0
Hail Insurance	0	0
Drying & Other Costs	44	44
Certification Cost	8	8
Land Taxes	43	43
Storage Costs	0	0
Interest on Operating	15	10
Total Operating	397	249
Fixed Costs		
Land Investment Costs	240	240
Machinery Costs	213	213
Total Fixed	454	454

Owners - Labour & Living	128	128
Total Costs	979	831

Table 12.2: Organic versus conventional annual yields, prices, revenues, costs of production, net returns, transition costs, and 10-year net return difference at Glenlea, MB.

Rotation	Yield (t/ha)	Price ($/t)	Revenue ($/ha)	Cost ($/ha)	Net Return ($/ha)
Organic (Average)			1,983	1,315	667
Wheat	1.75	603	1,056	1,715	-659
Flax	0.49	1,831	892	1,736	-844
Alfalfa	2.40	641	1,538	979	560
Alfalfa	6.94	641	4,445	831	3,614
Conventional (Average)			804	1,340	-536
Wheat	2.74	313	858	1,556	-698
Flax	0.65	630	406	1,368	-961
Oats	2.73	275	749	1,439	-690
Soybean	1.90	634	1,203	998	204
Long-term Net Return Difference ($/ha)					1,204
Transition Cost ($/ha)					-878
10-year Average Net Return Difference ($/ha)					579

4.2 Moose Creek Farm

Moose Creek Farm has a complicated rotation that roughly includes 50% fallow. The rotation snapshot modeled here is from 2022. Revenue comes from wheat, flax, oat, hemp, green feed and alfalfa seed. Hemp, green feed and alfalfa seed prices were provided by the farm. Yield information was sourced from Graves (2024). Moose Creek farm's specific cost budgets are shown in Table 13.1. Moose Creek Farm has higher long-term net returns and 10-year average net return compared to the simulated comparable conventional rotation (Table 13.2).

Table 13.1: Organic production cost budgets in dollars per hectare for Moose Creek Farms wheat, flax, oat, hemp, green feed, alfalfa seed and fallow.

	Wheat	**Flax**	**Oat**	**Hemp**	**Green Feed**	**Alfalfa Seed**	**Fallow**
$/ha	ORG	ORG	ORG	ORG	ORG	ORG	ORG
Operating Costs							
Seed	122	100	181	178	170	0	0
Underseed	64	54	64	54	64	0	0
Manure	0	0	0	0	0	0	96
Fuel	55	55	55	55	55	55	55
Machinery Operating	20	20	20	20	20	20	20
Labour - Hired	18	18	18	18	18	18	18
Crop Insurance	15	70	45	58	0	0	0
Hail Insurance	17	36	17	56	0	0	0
Drying & Other Costs	57	57	57	57	57	57	57
Certification Cost	3	3	3	3	3	3	3
Land Rent	124	124	124	124	124	124	124
Total Operating	495	537	583	623	510	276	373
Owner Labour	110	110	110	110	110	110	110
Fixed Costs							
Machinery Costs	109	109	109	109	109	109	109
Building cost	22	22	22	22	22	22	22
Total Fixed	131	131	131	131	131	131	131
Total Cost	736	778	824	864	751	518	614

Table 13.2: Organic versus conventional annual yields, prices, revenues, costs of production, net returns, transition costs, and 10-year net return difference at Moose Creek Farm, SK.

Rotation	Area (%)	Yield (t/ha)	Price ($/t)	Revenue ($/ha)	Cost ($/ha)	Net Return ($/ha)
Organic (Average)				672	685	-12
Wheat	23.9	2.02	603	1,216	736	480
Flax	5.3	0.94	1,831	1,723	778	945
Oat	7.4	2.67	502	1,339	824	515
Hemp	6.9	0.45	4,497	2,015	864	1,151
Green Feed	2.8	5.60	100	561	751	-191
Alfalfa Seed	4.2	0.11	7,628	854	518	337
Fallow	49.4	0.00	0	0	614	-614
Conventional (Average)				1,171	1,465	-294
Wheat	25	3.30	313	1,032	1,556	-524
Canola	25	2.62	616	1,615	1,508	107
Flax	25	1.48	630	932	1,368	-435
Pea	25	2.56	432	1,104	1,429	-325
Long-term Net Return Difference ($/ha)						282
Transition Cost ($/ha)						-58
10-year Average Net Return Difference ($/ha)						180

4.3 Harrow

The rotation at Harrow, Ontario, includes corn, soybean and winter wheat for both organic and conventional production. Winter wheat costs were established by OMAFRA (2024a). Yield information was sourced from Graves (2024). While the transition period has lower net returns, the long-term average annual gain from organic production over 10-years is positive (Table 14).

Table 14: Organic versus conventional annual yields, prices, revenues, costs of production, net returns, transition costs, and 10-year net return difference at Harrow, ON.

Rotation	**Yield (t/ha)**	**Price ($/t)**	**Revenue ($/ha)**	**Cost ($/ha)**	**Net Return ($/ha)**
Organic (Average)			4,224	1,492	2,732
Corn	11.50	511	5,876	1,737	4,139
Soybean	3.35	1,402	4,697	1,316	3,381
Wheat	3.48	603	2,100	1,423	676
Conventional (Average)			2,371	1,483	888
Corn	13.23	252	3,328	2,126	1,202
Soybean	3.27	634	2,074	998	1,076
Wheat	5.47	313	1,712	1,326	385
Long-term Net Return Difference ($/ha)					1,845
Transition Cost ($/ha)					-343
10-year Average Net Return Difference ($/ha)					1188

4.4 Victoriaville

The rotation at Victoriaville, Quebec, includes corn, soybean and wheat for the conventional rotation, with the inclusion of barley (alternating with wheat) in the organic rotation. Yield information was sourced from Graves (2024). While the transition period has lower net returns, the long-term average annual gain from organic production over 10-years is positive (Table 14).

Table 15: Organic versus conventional annual yields, prices, revenues, costs of production, net returns, transition costs, and 10-year net return difference at Victoriaville, QC.

Rotation	**Yield (t/ha)**	**Price ($/t)**	**Revenue ($/ha)**	**Cost ($/ha)**	**Net Return ($/ha)**
Organic (Average)			2,684	1,517	1,167
Corn	7.33	511	3,745	1,737	2,009
Soybean	2.22	1,402	3,110	1,316	1,794
Wheat	2.37	505	1,197	1,497	-301
Conventional (Average)			1,611	1,483	127
Corn	8.34	252	2,098	2,126	-28
Soybean	2.74	634	1,740	998	742
Wheat	3.17	313	993	1,326	-333
Long-term Net Return Difference ($/ha)					1,040
Transition Cost ($/ha)					-313
10-year Average Net Return Difference ($/ha)					634

5. Conclusions

For most crops the transition is costly (return values are negative). Corn is a high enough yielding crop that many prices are profitable, giving a positive net return even during organic transition. Apple yields are low in the dataset, with organic apple yields being particularly bad. This makes the organic production less profitable than conventional and therefore makes long-term net return negative. This is also narrowly true for oat and pea. The costs of the transition for barley, lentil and chickpea make it so that 10-year long-term net returns are close to zero. However, barley, lentil and chickpea do have higher organic returns than conventional.

From the case studies, long-term organic net returns are generally positive, with short-term negative transition costs.

References

Abebe, G. K., Traboulsi, A., & Aoun, M. (2022). Performance of organic farming in developing countries: a case of organic tomato value chain in Lebanon. Renewable Agriculture and Food Systems, 37(3), 217–226. https://doi.org/10.1017/S1742170521000478

Afeworki, E., Polasub, W., Chiu, C., & Mullinix, K. (2015a). Southwest British Columbia small-scale farm enterprise budget: Carrot. Institute for Sustainable Food Systems. Kwantlen Polytechnic University. Technical Bulletin 2015-014.

Afeworki, E., Polasub, W., Chiu, C., & Mullinix, K. (2015b). Southwest British Columbia small-scale farm enterprise budget: Lettuce. Institute for Sustainable Food Systems. Kwantlen Polytechnic University. Technical Bulletin 2015-018.

Afeworki, E., Polasub, W., Chiu, C., & Mullinix, K. (2015c). Southwest British Columbia small-scale farm enterprise budget: Spinach. Institute for Sustainable Food Systems. Kwantlen Polytechnic University. Technical Bulletin 2015-020.

Agriculture Financial Services Corporation (AFSC). (2024). 2024 Forage Price List. https://afsc.ca/wp-content/uploads/2024/05/2024-Forage-Price-List.pdf

Boschiero, M., De Laurentiis, V., Caldeira, C., & Sala, S. (2023) Comparison of organic and conventional cropping systems: A systematic review of life cycle assessment studies. Environmental Impact Assessment Review, 102, 107187. https://doi.org/10.1016/j.eiar.2023.107187

Bouwman, T. (2024) Organic Agriculture and Climate Change Mitigation in Canada. Organic Task Force Technical Report. https://cog.ca/policy/organic-task-force/

Champagne, R. J., Wallace, J. M., Curran, W. S., & Baraibar, B. (2021). Agronomic and economic tradeoffs between alternative cover crop and organic soybean sequences. Renewable Agriculture and Food Systems, 36(1), 17–25. https://doi.org/10.1017/S1742170519000437

Crowder, D. W., & Reganold, J. P. (2015). Financial competitiveness of organic agriculture on a global scale. Proceedings of the National Academy of Sciences, 112(24), 7611–7616. https://doi.org/10.1073/pnas.1423674112

Environment and Climate Change Canada (ECCC). (2024). National Inventory Report, 1990–2022: Greenhouse Gas Sources and Sinks in Canada. https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html?utm_campaign=not-applicable&utm_medium=vanity-url&utm_source=canada-ca_ghg-inventory

Fonsah, E. G., Shealy, J. (2022). 2022 – Carrots Budget. University of Georgia Extension. https://agecon.uga.edu/extension/budgets.html

Froehlich, A. G., Melo, A. S. S. A., & Sampaio, B. (2018). Comparing the Profitability of Organic and Conventional Production in Family Farming: Empirical Evidence From Brazil. Ecological Economics, 150, 307–314. https://doi.org/10.1016/J.ECOLECON.2018.04.022

Grain Farmers of Ontario (GFO). (2024). Average commodity prices. https://gfo.ca/marketing/average-commodity-prices/

Graves, M. (2024). Holos Case Studies – OTF. Organic Task Force Technical Report. https://cog.ca/policy/organic-task-force/

Grovermann, C., Quiédeville, S., Muller, A., Leiber, F., Stolze, M., & Moakes, S. (2021). Does organic certification make economic sense for dairy farmers in Europe?–A latent class counterfactual analysis. Agricultural Economics, 52(6), 1001–1012. https://doi.org/https://doi.org/10.1111/agec.12662

Khanal, A. R., Mishra, S. K., & Honey, U. (2018). Certified organic food production, financial performance, and farm size: An unconditional quantile regression approach. Land Use Policy, 78, 367–376. https://doi.org/10.1016/J.LANDUSEPOL.2018.07.012

Kniss, A. R., Savage, S. D., & Jabbour, R. (2016). Commercial Crop Yields Reveal Strengths and Weaknesses for Organic Agriculture in the United States. PLOS ONE, 11(8), 1–16. https://doi.org/10.1371/journal.pone.0161673

Manitoba. (2024). Cost of production. https://www.gov.mb.ca/agriculture/farm-management/cost-production/index.html

Meng, F., Qiao, Y., Wu, W., Smith, P., & Scott, S. (2017). Environmental impacts and production performances of organic agriculture in China: A monetary valuation. Journal of Environmental Management, 188, 49–57. https://doi.org/10.1016/J.JENVMAN.2016.11.080

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). (2024a). Cost of production for crops and livestock. https://www.ontario.ca/page/cost-production-crops-and-livestock

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). (2024b). Horticultural crop statistics. https://www.ontario.ca/page/horticultural-crop-statistics

OrganicBiz. (2024). Markets. https://organicbiz.ca/category/markets/

Organic Grain Hub. (2024). Latest Prices. https://organicgrainhub.com/

Reganold, J. P., & Wachter, J. M. (2016). Organic agriculture in the twenty-first century. Nature Plants, 2(2), 15221. https://doi.org/10.1038/nplants.2015.221

Rosa-Schleich, J., Loos, J., Mußhoff, O., & Tscharntke, T. (2019). Ecological-economic trade-offs of Diversified Farming Systems – A review. Ecological Economics, 160, 251–263. https://doi.org/10.1016/J.ECOLECON.2019.03.002

Saskatchewan. (2024a). Saskatchewan's Dashboard – Agriculture and Environment. https://dashboard.saskatchewan.ca/agriculture

Saskatchewan. (2024b). Crop planning guide and crop planner. https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/farm-business-management/crop-planning-guide-and-crop-planner

Saskatchewan Crop Insurance Corporation (SCIC). (2024). Prices. https://www.scic.ca/crop-insurance/prices

Schader, C., Heidenreich, A., Kadzere, I., Egyir, I., Muriuki, A., Bandanaa, J., Clottey, J., Ndungu, J., Grovermann, C., Lazzarini, G., Blockeel, J., Borgemeister, C., Muller, A., Kabi, F., Fiaboe, K., Adamtey, N., Huber, B., Niggli, U., & Stolze, M. (2021). How is organic farming performing agronomically and economically in sub-Saharan Africa? Global Environmental Change, 70, 102325. https://doi.org/10.1016/J.GLOENVCHA.2021.102325

Smith, O. M., Cohen, A. L., Reganold, J. P., Jones, M. S., Orpet, R. J., Taylor, J. M., Thurman, J. H., Cornell, K. A., Olsson, R. L., Ge, Y., Kennedy, C. M., & Crowder, D. W. (2020). Landscape context affects the sustainability of organic farming systems. Proceedings of the National Academy of Sciences, 117(6), 2870–2878. https://doi.org/10.1073/pnas.1906909117

White, K. E., Cavigelli, M. A., Conklin, A. E., & Rasmann, C. (2019). Economic Performance of Long-term Organic and Conventional Crop Rotations in the Mid-Atlantic. Agronomy Journal, 111(3), 1358–1370. https://doi.org/https://doi.org/10.2134/agronj2018.09.0604

Wieme, R. A., Carpenter-Boggs, L. A., Crowder, D. W., Murphy, K. M., & Reganold, J. P. (2020). Agronomic and economic performance of organic forage, quinoa, and grain crop rotations in the Palouse region of the Pacific Northwest, USA. Agricultural Systems, 177, 102709. https://doi.org/10.1016/J.AGSY.2019.102709