



COSTS AND RETURNS FOR PRODUCING MICHIGAN ASPARAGUS



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KEY POINTS

- Interviews were conducted with nine growers with a total of 1,200 acres of asparagus.
- Establishment costs for new asparagus were estimated to be \$4,082 per acre.
- The market is shifting toward mixed production of cuts and tips, spears and fresh-market asparagus.
- Growers reported longer and higher peak yields in 2015 compared to 2009.
- Housing for labor was estimated to cost \$93 per acre per year for asparagus or \$0.03 per pound.
- Net cash flows of \$1,422 per acre were expected for peak bearing years.
- Cash flows became positive by Year 4, with accumulated negative cash flows completely paid off by Year 8.
- A price of \$0.64 per pound is required to cover cash costs of production.
- For stands with a peak yield of 4,000 pounds, a price of \$0.72 per pound is required to cover all costs, including a target rate of return of 7% on funds.
- The breakeven price assuming a 7% target rate of return increases to \$0.80 per pound for a peak yield of 3,500 pounds per acre.
- Increasing duration of peak yields will lead to higher returns over the life of a stand by increasing years with positive cash flow.

INTRODUCTION

Michigan has ranked second or third nationally in asparagus production since the last cost of production study was conducted in 2009 (Dartt, 2009). In 2015, Michigan growers harvested 22 million pounds of asparagus from 8,900 acres valued at \$19.7 million (USDA National Agricultural Statistics Service, 2015). This production comes from well-drained soils in the western Lower Peninsula. Asparagus is planted on these soils from rootstock, or “crowns,” planted 8 to 10 inches deep. The plants send up shoots in the spring, which are not harvested the year of planting and minimally harvested in the second year. This allows shoots to leaf out or develop “fern” and all the plants energy to be devoted to establishment. In the third and following years, asparagus shoots are harvested multiple times, with 20 or more pickings from mid-May to June.

Michigan asparagus is hand-harvested for multiple markets. Harvest crews travelling over rows on motorized carts snap spears at their base. Crews snap asparagus at different lengths for different markets. Asparagus is snapped at 7.5 inches for both cuts and tips, and frozen spears. For cuts and tips, asparagus is cut into smaller pieces at local processors for use in frozen food. For spears, the entire spear is canned or frozen. Finally, asparagus is snapped at 9.5 inches for the fresh market and sent to local packers, who ship this product to regional grocery stores. Each field can be picked multiple times, with growers making decisions daily about what markets each field should be picked for.

The Michigan asparagus industry has created updated budgets every 7 years since 1995, allowing growers to track



changes in production costs and returns. Since the last study in 2009, significant changes in asparagus marketing have taken place. In the 2009 study, 100% of the crop was budgeted for cuts and tips. The market has now transformed to include significant spear and fresh-market production. Our goal was to create a budget accounting for this mixed production to:

- Provide the industry an updated, unbiased cost of production as of 2015.
- Highlight changes in costs and returns since 2009.
- Estimate the cost of housing labor to the producer.
- Show cash flows over time for a typical asparagus planting.

ASSUMPTIONS

- To standardize machinery operating costs, we used published custom rates (Stein, 2015) and local custom rates reported by agriculture suppliers and growers.
- Crop inputs were based on:
 - The predominant practice used by cooperators.
 - Cost/unit for inputs based on Oceana County and Mason County growers and agriculture suppliers.
 - The average or predominant rate per acre of inputs, whichever the data suggested was more relevant.
 - Information from those growers with the best records for specific costs, when not all growers were able to provide information.
- Tailgate prices were used to calculate revenues, which are prices paid to producers after reductions in price due to grade. For example, the contracted price for cuts and tips was \$.79 per pound, but if 96% of the delivered product met grade, the actual price to the producer was \$.76 per pound.
- This budget is based on interviews of experienced producers using best management practices. Actual costs and returns will vary from farm to farm.
- We used the same format as the 2002 and 2009 studies so the industry can consistently track changes in costs and returns by category.

METHODS

We met individually with nine commercial growers representing approximately 1,200 acres of asparagus to estimate costs and revenues. We gathered additional information via phone and email from local agriculture suppliers. We consulted a local building contractor to estimate construction costs for new migrant labor housing. Annual budgets are in the appendix on page 10.

STAND LONGEVITY, YIELDS & MARKETS

Grower interviews suggest asparagus stands are maintaining higher peak yields for a longer period than in 2009. Stands were expected to last 12 to 16 years in 2015, with an average lifespan of 13 years, identical to the 2009 study. Growers expected stands to maintain peak yields of 3,000 to 5,000 pounds per acre, with an average of 4,000 pounds per acre for 6 years. In contrast, 2009 peak yields were estimated to be 3,500 pounds per acre and last 4 years. We combined this data with information on yields over time available from two growers and the Michigan Asparagus Research Farm (Bakker & Ball, 2014) to construct a yield model (Figure 1).

All growers now produce either fresh-market asparagus or spears along with cuts and tips. None produced cuts and tips exclusively. The height of the bars in Figure 1 depicts expected yield per acre vs. age of stand. This includes the impact of the stand age on expected yield. Different shadings represent the proportion expected to be sold to different markets. The growers surveyed averaged 33% cuts and tips, 12% spears and 55% fresh market. We used these percentages to allocate asparagus to these markets during years 4–11 of stand life (Figure 1). All asparagus was budgeted for cuts and tips in the early and late years of stand life due to lower fresh quality of young and old stands.

PRODUCTION COSTS & REVENUE

Overall, some input costs increased while others decreased in 2015 compared to the 2009 study (Table 1). In general, fertilizer and pesticide prices have decreased on a per unit basis. The largest decreases were in the cost of potash and the fungicide tebuconazole. The largest cost increase was for turkey litter, with the cost of asparagus seed and fumigation also increasing.



Figure 1. Average asparagus yields over 13 years

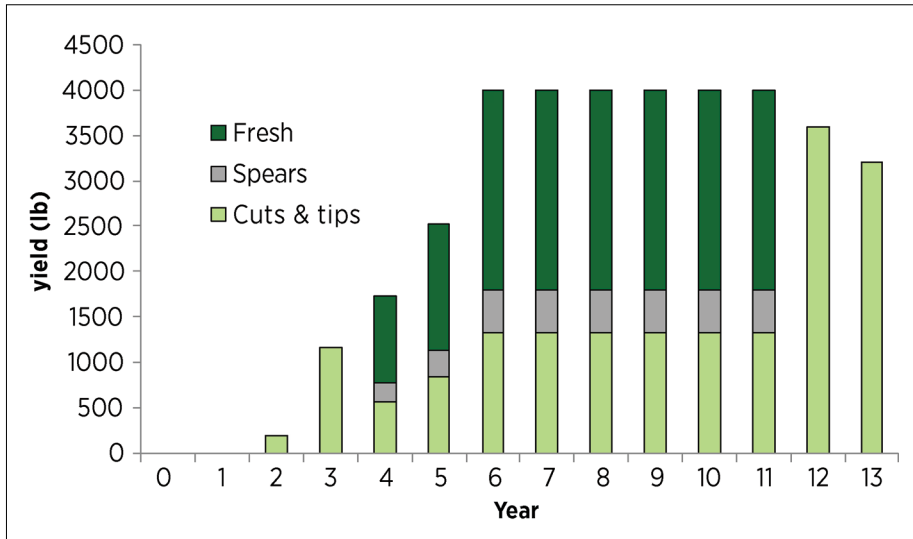


Table 1. Changes in costs of key inputs that could be compared between the 2009 and 2015 cost of production

Item	2009	2015	% change
Asparagus seed	\$435 per 20,000 seeds	\$800 per 20,000 seeds	+84%
Asparagus crowns	\$50.00 per 1,000	\$54.67 per 1,000	+9%
K2O as potash	\$0.57 per lb actual K	\$0.17 per lb actual K	-62%
Nitrogen as urea	\$0.53 per lb actual N	\$0.37 per lb actual N	-29%
Turkey litter	\$23.50 per acre for 3 ton	\$171 per acre for 3 ton	+628%
Fumigation	\$456.25 per acre	\$627.25 per acre	+37%
Dual Magnum	\$107.55 per gal	\$95.89 per gal	-11%
Spartan	\$552.13 per gal	\$539.90 per gal	-2%
Sencor*	\$15.34 per lb	\$13.82 per lb	-10%
Karmex*	\$6.73 per lb	\$4.70 per lb	-30%
Lorox	\$18.79 per lb	\$21.10 per lb	+12%
Folicur*	\$145.66 per gal	\$73.25 per gal	-50%

*Switched to generics in the 2015 vs. 2009 budget

Establishment costs (years 0-2)

Years 0-2 include the year before planting, the planting year, and the year after planting. Excluding harvest costs from Year 2, overall establishment costs totaled \$4,082 per acre for 2015, which is lower but similar to the \$4,282 per acre budgeted in the 2009 study.

Asparagus seed

Most growers purchased 20,000 seeds per acre to send to crown growers the spring before planting. The price ranged from \$40 to \$43 per 1,000 seeds. Millennium was the most popular variety (6 of 6 growers), followed by Sequoia (2 of 6) and NJ1122 (1 of 6). The 2015 cost for Millennium of \$40 per 1,000 seeds was used for this study.

Cash and cover crops in Year 0

Most growers (4 of 7) reported planting a cash crop the spring before asparagus, including field corn, small grains, or zucchini. Two farms planted cover crops including sorghum-sudangrass, mustard or rye, and one left land fallow. Almost all growers reported sowing 1.5 to 2.5 bushels per acre of rye the year before planting after fall fumigation, with 2 bushels the most common. The year of planting most (7 of 8) growers planted a fall rye (5 of 8) or oat (4 of 8) cover (some growers used either depending on the year). We budgeted for 2 bushels per acre of rye for Year 0 and all following years.

Fertilizer

We assumed a cash crop was planted the spring before asparagus and assigned all input costs except lime, manure, fumigation, and a fall cover crop to this crop. Between 1.5 and 2 tons per acre of lime was applied the year before planting, with 1.5 tons most common. Increasingly, growers are applying lime using variable rate



spreading based on gridded soil samples. A local supplier charged \$44 per ton for variable rate application, for a cost of \$65 per acre for 1.5 tons.

Most growers (6 of 8) are using manure to partially supply nutrients during the planting year. Growers applied either 2,500 to 4,000 gallons per acre of hog manure (3 of 8) or 3 tons per acre of turkey litter (3 of 8) before planting. A local supplier sold turkey litter at a price of around \$57 per ton spread, or \$171 per acre for 3 tons.

During the planting year, growers applied dry or liquid fertilizer in-furrow with the plow. Liquid 10-34-0 was most common at a 10 to 20 gallon per acre rate, with 10 gallons the most common. The budgeted cost was \$32.76 per acre for 10 gallons. Other in-furrow fertilizers included DAP, MAP and a mixture of 10-34-0 and 28% UAN. Other details on typical fertility programs are included in yearly budgets.

Fumigation

The majority of growers (6 of 9) are fumigating. Sectagon 42 was applied at 71 to 75 gallons per acre, with 75 gallons the most common. Fumigant management plans cost \$250. For this study, we assumed this was spread over 10 acres for a cost of \$25 per acre. The total cost of application, material, and the fumigant management plan was \$627.25 per acre.

Research has demonstrated fumigation's benefit to longevity of asparagus stands, by showing it reduces inoculum of diseases contributing to replant decline (Hausbeck & Cortwright, 2008). Spread across 12 bearing years, fumigation has an annualized cost of \$67.95 per acre including interest. This cost could be paid for by approximately 100 pounds per year of fresh-market asparagus.

Pesticides

Details on pesticide programs for years 1-2 are included in the footnotes of annual budgets.

Asparagus crowns

Interviewees planted 13,500 to 17,000 crowns per acre, averaging 15,000 crowns per acre. This represents a 1,000 crown per acre increase from the 2009 study. Overall, crown costs increased by \$120 per acre or 17% since 2009, largely due to denser plantings but also due to a small increase in per unit crown costs, which include a charge for fungicidal soaks.

Peak bearing years (years 6-11)

Fertilization

Soil testing

Many growers are now using gridded soil sampling. A common grid size was two acres, for a cost of \$8 per acre every 3 years.

Limestone

Growers estimate they apply between 1 to 2 tons per acre of lime based on soil tests every 4 years, averaging 1.5 tons per acre.

Nutrients

Fertility programs are included in annual budgets. In addition to budgeted nutrients, roughly half of growers applied 48 to 62 pounds per acre of ammonium sulfate to supply sulfur and part of nitrogen needs.

Labor costs – housing

Migrant labor supplies have diminished since 2009, and finding and keeping a labor force for the entire harvest is a challenge. Attracting and keeping harvest workers is more important than ever. Growers know providing good quality housing is expected in order to attract a crew, but they may not know how much housing contributes to total costs.

Housing costs using an example farm

To determine the costs of building and maintaining worker housing, we simulated a 65-acre asparagus farm. Grower interviews indicated on average they need one hand laborer for each 6.5 acres of asparagus. Housing for 10 workers (two, 5-person crews) was needed for 65 acres. We assumed an occupancy rate of 40% for housing. In other words, 40% of the legal occupancy was used by actual workers. It was common for an entire family, with one or two harvest workers, to live in a portion of housing that could have housed a group of single men. Most producers also grew other vegetables or fruit crops, and the housing was used for harvest workers for those crops as well.

To provide the housing required for the example farm, three 8-person units with a capacity of 24 workers was needed (10 actual workers ÷ 24-person capacity = 42% occupancy). Data from growers and contractors indicated an 8-person unit with 864 square feet had turnkey construction costs – including septic and well – of \$56 per square foot. We budgeted an additional \$4 per square foot for miscellaneous costs such as land forming, site preparation, and road gravel. Therefore, the total construction cost for new housing was



\$60 per square foot. This estimate was used in combination with grower estimates of annual repair costs to calculate annual housing costs (Table 2).

We estimated this housing to have a 30-year useful life. Several knowledgeable real estate professionals and a commercial producer that built housing that is now 28 years old estimated that residual value (salvage value) with the maintenance budget used would be approximately 50% of new cost. Interest was charged using average investment value.

Annual housing costs also include utilities such as electricity, heating, and air conditioning. One-half of the growers that provided housing paid these utilities (4 of 9), while one-half

required the workers to pay (4 of 9). Growers that did not pay utilities felt it incentivized the workers to use energy efficiently. A final grower (1 of 9) did not provide housing. These budgets did not include the grower paying utilities.

Labor costs – harvest

Asparagus is hand-harvested. Fields can be picked more than 20 times during the harvest season. A 5-person harvest crew picking a field in peak production can pick up to 10,000 pounds per day. Most harvest crews are paid on a piece rate.

The confidential grower interviews indicated the following piece rate ranges (Table 3). Additionally, employers paid Social Security, Medicare and unemployment insurance.

Table 2. Calculations for estimating the annual cost of housing 10 harvest workers

Construction cost new	3 units of 864 sq ft x \$60/sq ft = \$155,520
Economic depreciation	$\$155,520 - \$77,760 \text{ salvage value} \div 30 \text{ yr useful life} = \mathbf{\$2,592/yr}$
Interest	Interest on average investment value = $(\$155,520 + \$77,760)/2 \times 5.5\% = \mathbf{\$6,415/yr}$
Repairs	$\$1191/\text{duplex/yr} \times 3 \text{ duplexes} = \mathbf{\$3,573/yr}$
Taxes and insurance	1.5% of construction cost = \$2,333/yr
Inspection fees	$\$5/100 \text{ square ft} \times (2592 \text{ sq ft} \div 100) = \mathbf{\$130/yr}$
Total annual cost	$\$2,592 + \$6,415 + \$3,573 + \$2,333 + \$130 = \mathbf{\$15,043}$
Cost assigned to asparagus	40% of \$15,043 = \$6,017/yr
Cost per acre	$\$6,017 \div 65 \text{ acres} = \mathbf{\$93/acre/yr}$
Cost per lb	Average yield/acre during bearing years = 3,300 lb $\$93/\text{acre} \div 3,300 \text{ lb/acre} = \mathbf{\$0.03/lb}$

Table 3. Estimated wages and benefits for asparagus harvesters

Item	Cuts & Tips	Spears	Fresh
Piece rate range	\$.16 to \$.21/lb	\$.19 to \$.20/lb	\$.18 to \$.20/lb
Average piece rate	\$.18/lb	\$.20/lb	\$.19/lb
Housing	\$.03/lb	\$.03/lb	\$.03/lb
<i>Employer paid benefits</i>			
Social Security	6.20%	6.20%	6.20%
Medicare	1.45%	1.45%	1.45%
Unemployment	10.88%	10.88%	10.88%
<i>Total piece rate including housing & benefits</i>	\$.25/lb	\$.27/lb	\$.26/lb



Tailgate price is defined as the price paid to the producer after reductions in price due to grade. For example, the contracted price for cuts and tips was \$.79 per pound, but because 96% of the delivered product met grade, the actual price to the producer was \$.76 per pound (Table 4). This was also true for spears and fresh. The revenue in the budgets is based on what the producer was paid for. Note that tailgate prices for fresh asparagus showed significant variation among farms (Table 4).

Table 4. Average 2015 tailgate prices for cuts & tips, spears, and fresh-market asparagus, plus the range in tailgate fresh price among eight interviewed farms (prices before assessments)

Product	Average price	Range (fresh only)
Cuts & tips	\$.76 ¹	N/A
Spears	\$.88 ²	N/A
Fresh	\$.90 ³	\$.79-\$1.09/lb

¹ Contract price of \$.79/lb after 96% packout
² Average of two processor prices after 95% packout
³ Average of price received by grower per pound delivered

Pre- and post-harvest sprays

All growers applied a mix of post- and pre-emergence herbicides and chlorpyrifos for cutworms before harvest. Based on grower data (Table 5), we budgeted for a pre-harvest spray of Roundup PowerMax, Spartan, diuron 80DF and chlorpyrifos 4E at average rates. After harvest, growers either mowed or relied on a clean picking to avoid herbicide damage from lay-by applications. All applied glyphosate at lay-by, but 6 of 9 growers added a second burndown material, most commonly 2,4-D but also dicamba. Growers commonly made a second application of diuron post-harvest for broadleaves (Table 5). Most also applied metribuzin pre- or post-harvest, with post-harvest application more common. For grasses, Dual Magnum was typically applied once, either pre- or post-harvest, with a post-harvest application more common. We budgeted for a post-harvest spray of Roundup PowerMax, Formula 40 (2,4-D), Dual Magnum, diuron 80DF, and metribuzin 75DF.

Table 5. The percentage of growers using different pesticides in pre-and post-harvest weed sprays

Product	% growers using product		
	Pre-harvest	Post-harvest	At least once
Glyphosate	100%	100%	100%
2,4-D	11%	56%	56%
dicamba	0%	22%	22%
diuron 80DF	89%	78%	100%
Dual Magnum	44%	78%	100%
Spartan	56%	NA	56%
metribuzin 75DF	11%	44%	56%
Sinbar WDG	22%	0%	22%
Sandea	0%	11%	11%
chlorpyrifos 4E	86%	0%	86%

Note: Names are in lower case for products where growers mainly used generics.

Beetle sprays during harvest

Growers reported they apply carbaryl from zero to three times during harvest for common asparagus beetle. We budgeted for two applications of carbaryl.

Fern sprays

Growers applied an average of four sprays during the fern season (ranging from 3 to 6 applications). All growers applied chlorothalonil for purple spot and the majority applied carbaryl and/or permethrin for common asparagus beetle and tarnished plant bug (Table 6). For rust, 5 of 9 growers applied tebuconazole. Two growers instead applied mancozeb in combination with chlorothalonil, while another grower with primarily Jersey varieties only applied tebuconazole to acreage of Millennium, which is more susceptible to rust.

Land rent

Land rental rates varied greatly between growers. As with any lease, both the landowner and producer were meeting their objectives, but in different ways. For example, a grower paying near the low end of the range in the early years might pay near the high end when full production began. It was common for growers to pay less cash rent early and gradually ramp up the rental rate as production began to increase. Others started off near the middle of the range and ramped up rental rates as production increased, but did not pay at the higher end when full production was reached.



Table 6. The percentage of growers using different pesticides in fern sprays and common application rates

Product	% using	Rates
chlorothalonil (liquid or dry)	100%	1 qt or 1-2 lb
tebuconazole 3.6	56%	4-6 oz
mancozeb	33%	2 lb
Sevin XLR or Carbaryl 4F	89%	1-2 qt
permethrin 3.2EC	78%	3-4 oz

Note: Names are in lower case for products where growers mainly used generics.

Below are the rental rates and ranges:

- **Planting year:** Rents ranged from \$0 to \$50 per acre with \$50 being the most predominant.
- **Year 2 (year after planting):** Rents ranged from \$50 per acre to 150 pounds per acre at the Michigan Agricultural Cooperative Marketing Association (MACMA) contract price. The 150 pounds at the MACMA price (\$118.50 per acre) was a guaranteed rate regardless of actual yield. We used the average, or \$69.75 per acre.
- **Year 3:** The range of rental rates was \$50 per acre to 150 pounds per acre at the MACMA price (\$118.50 per acre). The average of \$96 per acre was selected.
- **Years 4-13:** Rental rates ranged from \$50 per acre to 200 pounds per acre at the MACMA price (\$158 per acre). The average of \$130 per acre was used.

ENTERPRISE COSTS & RETURNS AND NET CASH FLOW OVER TIME

Net revenue during peak production increased in comparison to 2009 for these reasons:

- A higher peak yield (4,000 pounds per acre vs. 3,500)
- Higher sales prices in the spear and fresh markets compared to cuts and tips (Table 4)

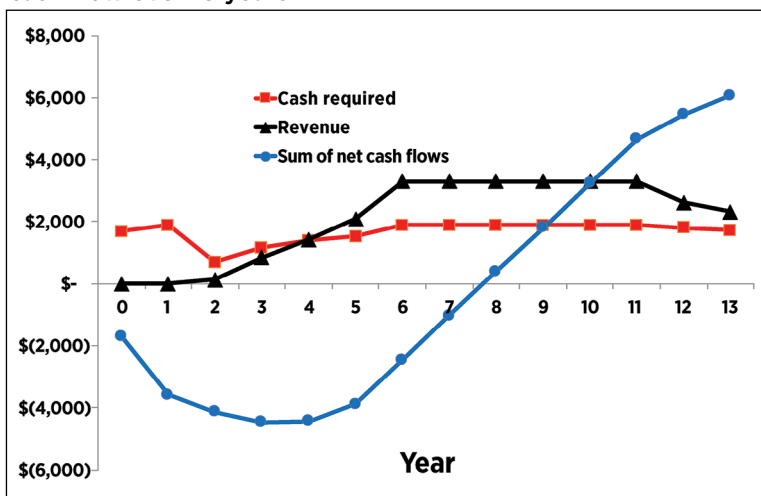
- Six years of peak yields in 2015 in comparison to 4 years in 2009

The development of the spear and fresh markets has been customer driven. Consumers now prefer fresh, with the market for frozen spears developing, compared to cuts and tips used in frozen foods. This marketing change – in addition to higher contract prices for cuts and tips – has produced a weighted average price of \$0.80 per pound across all years and all harvests in comparison to the budgeted price of \$0.70 per pound in 2009. Budgeted net cash revenue during peak years in 2009 was \$509 per acre, while it was \$1,422 per acre in 2015.

During peak years, sales of higher value product (\$.88 per pound for spears and \$.90 per pound for fresh), plus higher peak yields (3,500 pounds per acre in 2009 vs. 4,000 pounds per acre in 2015), led to an increase of \$857 in gross revenue compared to 2009. Cash expenses during peak years were also budgeted at \$60 per year less in 2015 than 2009. This decrease could in part be due to decreased input costs, but also from differences in the way expenses were calculated.

In Year 4, cash revenues exceeded cash expenses (Figure 2). The positive cash flows starting in Year 4 and afterward can be used to pay back the initial pre-production costs and negative cash flows during the pre-production years. Cumulative cash flows turn positive in Year 8, indicating that all investment and the negative cash flows from earlier years have been recovered.

Figure 2. Cash expenses, gross revenues and cumulative net cash flow over 13 years





BREAK EVEN PRICE AND RATES OF RETURN

Table 7 summarizes expected yield and key economic measures, by year, over the 13-year life of the stand including present value analysis. Present value is the current worth of a future sum of money or stream of cash flows at a specified rate of return, or discount. For example, receiving \$1,000 now is worth more than \$1,000 5 years from now, because if you got the money now, you could invest it and receive an additional return over the 5 years. The budget model in this report produced a 12% rate of return. That is, future cash flows would have to earn a 12% rate of return to equal present cash flows (Table 7). This evaluation process is sometimes called life-cycle accounting.

Over the 13-year production period, total cash required was \$23,204 per acre and 36,390 pounds of asparagus was produced, so that a total of \$0.64 cash per pound was required to pay expenses. Total revenue was \$29,276, producing an average price over all years of \$.80 per pound. A net cash flow of \$0.17 per pound was produced.

Table 8 depicts the peak yield and price necessary to achieve different targeted rates of return. With the cost of borrowed capital at 5%, a producer’s profitability goal should be higher, with some additional margin to buffer against risk. A 7% target rate of return could achieve this. We estimate growers would need to receive \$0.72 per pound at a 4,000 pound peak yield to achieve a 7% return (Table 8). The price needed to achieve a given return will vary with peak yield. For example, we estimate that growers with peak yields of 3,000 pounds per acre would need a

Table 7. Expected expenses, revenues and cash flows based on budgets for individual production years

Year	lbs picked	Cash required	Gross revenue	Net cash flow	Sum of net cash flows	Present value of net cash flows	Sum of present values to year
0	0	\$1,685	\$-	\$(1,685)	\$(1,685)	\$(1,685)	\$(1,685)
1	0	\$1,891	\$-	\$(1,891)	\$(3,576)	\$(1,692)	\$(3,377)
2	190	\$696	\$138	\$(557)	\$(4,134)	\$(446)	\$(3,823)
3	1160	\$1,164	\$844	\$(320)	\$(4,454)	\$(229)	\$(4,052)
4	1720	\$1,401	\$1,422	\$21	\$(4,432)	\$14	\$(4,038)
5	2520	\$1,523	\$2,083	\$560	\$(3,872)	\$321	\$(3,717)
6	4000	\$1,885	\$3,307	\$1,422	\$(2,450)	\$728	\$(2,989)
7	4000	\$1,885	\$3,307	\$1,422	\$(1,028)	\$651	\$(2,338)
8	4000	\$1,885	\$3,307	\$1,422	\$394	\$582	\$(1,756)
9	4000	\$1,885	\$3,307	\$1,422	\$1,817	\$521	\$(1,235)
10	4000	\$1,885	\$3,307	\$1,422	\$3,239	\$466	\$(769)
11	4000	\$1,885	\$3,307	\$1,422	\$4,661	\$417	\$(353)
12	3600	\$1,816	\$2,618	\$802	\$5,463	\$210	\$(143)
13	3200	\$1,719	\$2,327	\$609	\$6,072	\$143	\$0
Total	36,390	\$23,204	\$29,276				



higher price of \$0.89 per pound to achieve a 7% return, growers with peak yields of 3,500 pounds per acre would require \$0.80 per pound, and growers with 5,000 pounds per acre peak yields could achieve this return at \$0.63 per pound (Table 8).

Table 8. Prices required to cover all costs with different target rates of return and different yields during full production years

Average Yield During Full Production Years (lb/acre)					
% Return	3000	3500	4000	4500	5000
0	\$0.77	\$0.70	\$0.64	\$0.59	\$0.56
3	\$0.82	\$0.73	\$0.67	\$0.62	\$0.58
5	\$0.85	\$0.76	\$0.70	\$0.64	\$0.60
7	\$0.89	\$0.80	\$0.72	\$0.67	\$0.63
9	\$0.93	\$0.83	\$0.76	\$0.70	\$0.65
11	\$0.98	\$0.87	\$0.79	\$0.73	\$0.68
13	\$1.03	\$0.91	\$0.83	\$0.76	\$0.71

How much production would be required to achieve a 7% rate of return? Based on these budgets, a stand producing 3,446 pounds per acre during peak years could achieve this rate of return at current prices. This stand would be expected to produce 31,355 pounds per acre over its lifetime, for an average of 2612 pounds per acre per year over the bearing years.

CONCLUSIONS

Asparagus is a long-term investment that can payoff. The key to long-term profitability is to do everything with a long-term view. Doing things right in the early years should result in a long-lived, profitable stand. Improvements in technology and management have translated to higher peak yields and a longer number of peak yield years in comparison to earlier studies. Management practices that help maintain stand longevity – including variety selection and fumigation – help accomplish this.

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REFERENCES

- Bakker, J., & Ball, T. (2014). Third international cultivar trial (2003). In *Michigan Asparagus Research 2014* (pp. 5–9). Dewitt, MI: Michigan Asparagus Research Committee.
- Dartt, B. (2009). *2009 draft asparagus cost of production*. Portage, MI: Lookout Ridge Consulting.
- Hausbeck, M. K., & Cortright, B. (2008, December). *New management techniques for Fusarium and Phytophthora control in asparagus production*. Presented at the Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, MI. Retrieved from <http://www.glexpo.com/summaries/2008summaries/asparagus.pdf>
- Stein, D. (2015). *2015 Custom machine work costs* (FIRM Team Fact Sheet Number 15-01) (p. 4). East Lansing, MI: Michigan State University, MSU FIRM Team. Retrieved from <http://www.firm.msue.msu.edu>
- USDA National Agricultural Statistics Service. (2015). *Quick stats tool*. Retrieved April 18, 2016, from https://www.nass.usda.gov/Quick_Stats/



APPENDIX

Michigan State University Extension 2015 Asparagus Cost of Production

Asparagus spears, cuts and tips, and fresh market – YEAR BEFORE PLANTING				
	Quantity	Unit	\$/ Unit	\$/Acre
REVENUES				0
TOTAL				\$ –
CASH EXPENSES				
Asparagus seed ¹	20	1,000 seeds	\$40.00	\$800.00
Fertilizer				
Soil test ²	0.5	sample	\$16.00	\$8.00
Limestone (variable rate)	1.5	ton	\$37.00	\$55.50
Limestone application (variable rate)	1.5	ton	\$7.00	\$10.50
Fumigation				
Disking	2	time(s)	\$15.12	\$30.24
Sectagon 42 (material + application)	75	gal	\$8.03	\$602.25
Fumigant mgmt plan (10 ac) ³	1	each	\$25.00	\$25.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Tillage for cover crop ⁴	1	time(s)	\$13.19	\$13.19
Land rent ⁵				\$0.00
Interest on operating costs for one year			5%	\$78.33
Management & supervision labor ⁶				\$40.00
TOTAL EXPENSES				\$1,685.01

¹ Average cost of Millenium and Vilmorin NJ varieties

² Gridded soil sampling on a 2-acre grid, or 0.5 samples per acre

³ Cost of \$250 fumigant management plan spread over 10 acres

⁴ Assumes rye seed is worked into soil with a field cultivator or similar implement

⁵ Assumes land rents are charged to a cash crop grown before asparagus

⁶ Assumes 1.4% annual increase over 2009 rates for cost of living over period 2010-2015



Asparagus spears, cuts and tips, and fresh market – PLANTING YEAR				
	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				\$ –
TOTAL				\$ –
CASH EXPENSES				
Asparagus crowns				
Crowns	15	1000 crowns	\$50.00	\$750.00
Crown soaks ¹	5	boxes	\$8.00	\$40.00
Box rental ¹	5	boxes	\$6.00	\$30.00
Soil prep				
Turkey litter (material & application)	3	ton	\$57.00	\$171.00
Disking	1	time(s)	\$15.12	\$15.12
Trenching & fertilizer delivery ²	1	time(s)	\$57.00	\$57.00
10-34-0 (material cost)	117	lb	\$0.28	\$32.76
Planting				
Planting labor ³	16	hr	\$10.40	\$166.40
Planting charge – machinery ⁴				\$27.00
Covering crowns ⁵				\$20.00
Post-planting herbicides				
Materials ⁶	2	time(s)	\$20.22	\$40.44
Application	2	time(s)	\$8.00	\$16.00
Cultivate & weed				
Hoeing	5	hr	\$10.40	\$52.00
Row cultivate	2	time(s)	\$14.12	\$28.24
Fern sprays				
Materials ⁷	4	time(s)	\$24.75	\$99.00
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Oat seed	2	bu	\$7.00	\$14.00
Spreading cost	1	time(s)	\$8.00	\$8.00
Land rent				\$50.00
Interest on operating costs for one year			5%	\$82.45
Management & supervision labor ⁸	5	hr	\$32.00	\$160.00
TOTAL EXPENSES				\$1,891.41

¹ Assumes there are 3,000 crowns per box

² Average cost per acre, based on custom rates for both 2- and 3-bottom plows, includes tractor and labor

³ Assumes a wage of \$8.50/hr plus benefits

⁴ Based on costs for hauling 5 apple bins short distances on a flatbed truck and unloading them with a lift tractor, from the 2014 MSU apple cost of production study, plus an additional \$5/acre charge to account for costs of a tractor and wagon

⁵ Estimated grower cost of covering furrows with a tractor and backblade

⁶ Application of Lorox DF (1X@1lb, 1X@0.5lb) and generic chlorpyrifos 4E (1X@1qt)

⁷ Application of Bravo Weatherstik (4X@1qt), generic tebuconazole 3.6L (2X@4oz), Perm-Up 3.2EC (4X@4oz), Sevin XLR Plus (4X@2pt), and generic clethodim 26% a.i. (1X@7oz)

⁸ Assumes 1.4% annual increase over 2009 rates for cost of living over period 2010-2015



Asparagus spears, cuts and tips, and fresh market – YEAR AFTER PLANTING				
	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	190	lb	\$0.76	\$138.19
Spears ¹	0		\$0.88	\$ –
Fresh market ²	0		\$0.90	\$ –
TOTAL	190	lb		\$138.19
CASH EXPENSES				
Disking	1	time(s)	\$15.12	\$15.12
Leveling (field cultivator)	1	time(s)	\$13.19	\$13.19
Fertilizer				
Urea (68# actual N) ³	150	lb	\$0.17	\$25.50
Potash (144# actual K)	240	lb	\$0.17	\$40.80
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application	1	time(s)	\$6.25	\$6.25
Blending	0.2	ton	\$6.50	\$1.30
Pre-harvest spray				\$0.00
Materials ⁴	1	time(s)	\$48.06	\$48.06
Application	1	time(s)	\$8.00	\$8.00
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	1	time(s)		\$0.38
Truck transport to receiving station ⁵				\$15.60
Labor – cuts & tips ⁶	190	lb	\$0.22	\$41.80
Worker housing				\$93.00
Fern sprays				
Materials ⁷	5	time(s)	\$20.25	\$101.25
Application	5	time(s)	\$8.00	\$40.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop ⁸	1	time(s)	\$12.80	\$12.80
Land rent				\$70.00
Interest on operating costs for 4 months ⁹				\$8.54
Management & supervision labor ¹⁰				\$85.00
TOTAL EXPENSES				\$695.57

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb Michigan Asparagus Advisory Board (MAAB) assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ 33% of interviewed farms also applied ammonium sulfate

⁴ Application of Spartan (1X@4oz), Dual Magnum (1X@1.5pt), and generic diuron 80DF (1X@1.5 lb) plus a spreader sticker

⁵ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁶ Piece rate of \$0.18/lb plus benefits

⁷ Application of Bravo Weatherstik (5X@1qt), generic tebuconazole 3.6L (2X@4oz), Perm-Up 3.2EC (5X@4oz), and Sevin XLR Plus (5X@1.5pt)

⁸ MSU custom rate for corn stalk shredder

⁹ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹⁰ Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015



Asparagus spears, cuts and tips, and fresh market - YEAR 3

	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	1160	lb	\$0.76	\$843.67
Spears ¹	0		\$0.88	\$ —
Fresh market ²	0		\$0.90	\$ —
TOTAL	1160	lb		\$843.67
CASH EXPENSES				
Fertilizer				
Soil test ³	0.5	sample(s)	\$16.00	\$8.00
Urea (46# actual N)	100	lb	\$0.17	\$17.00
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.18	ton	\$6.50	\$1.17
Pre-harvest spray				
Materials ⁴	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00
Spring fern chop	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	2.82	ga	\$2.16	\$6.09
Truck transport to receiving station ⁵				\$15.60
Labor - cuts & tips ⁶	1160	lb	\$0.22	\$255.20
Worker housing				\$93.00
Port-a-potties ⁷				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays - application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ⁸				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ⁹				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	8.00	\$32.00

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Asparagus spears, cuts and tips, and fresh market - YEAR 3				
	Quantity	Unit	\$/Unit	\$/Acre
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop	1	time(s)	\$12.80	\$12.80
Land rent				\$96.00
Interest on operating costs for 4 months ¹⁰				\$13.62
Management & supervision labor ¹¹	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,163.76

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Gridded soil sampling on a 2-acre grid, or 0.5 samples per acre

⁴ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁵ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁶ Piece rate of \$0.18/lb plus benefits

⁷ Assumes one port-a-potty per 32 acres of asparagus for 2 months

⁸ Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

⁹ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹⁰ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹¹ Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015

Asparagus spears, cuts and tips, and fresh market - YEAR 4				
	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	568	lb	\$0.76	\$412.82
Spears ¹	206	lb	\$0.88	\$174.39
Fresh market ²	946	lb	\$0.90	\$834.85
TOTAL REVENUE				\$1,422.05
CASH EXPENSES				
Fertilizer				
Limestone	1.5	ton	\$37.00	\$55.50
Limestone application	1	time(s)	\$7.00	\$7.00
Urea (69# actual N)	150	lb	\$0.17	\$25.50
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.21	ton	\$6.50	\$1.37

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Asparagus spears, cuts and tips, and fresh market – YEAR 4

	Quantity	Unit	\$/Unit	\$/Acre
Pre-harvest spray				
Materials ³	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00
Spring fern chop	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	2.82	gal	\$2.16	\$6.09
Truck transport to receiving station ⁴				\$15.60
Labor – cuts & tips ⁵	568	lb	\$0.22	\$124.87
Labor– spears ⁶	206	lb	\$0.24	\$49.54
Labor – fresh ⁷	946	lb	\$0.23	\$217.58
Worker housing				\$93.00
Port-a-potties ⁸				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays – application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ⁹				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ¹⁰				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop	1	time(s)	\$12.80	\$12.80
Land rent				\$130.00
Interest on operating costs for 4 months ¹¹				\$16.45
Management & supervision labor ¹²	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,400.57

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁴ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁵ Piece rate of \$0.18/lb plus benefits

⁶ Piece rate of \$0.20/lb plus benefits

⁷ Piece rate of \$0.19/lb plus benefits

⁸ Assumes one port-a-potty per 32 acres of asparagus for 2 months

⁹ Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

¹⁰ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹¹ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹² Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015



Asparagus spears, cuts and tips, and fresh market – YEAR 5				
	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	832	lb	\$0.76	\$604.82
Spears ¹	302	lb	\$0.88	\$255.50
Fresh market ²	1386	lb	\$0.90	\$1,223.15
TOTAL REVENUE	2520			\$2,083.47
CASH EXPENSES				
Fertilizer				
Urea (69# actual N)	150	lb	\$0.17	\$25.50
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.21	ton	\$6.50	\$1.37
Pre-harvest spray				
Materials ³	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00
Spring fern chop	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	2.82	gal	\$2.16	\$6.09
Truck transport to receiving station ⁴				\$15.60
Labor – cuts & tips ⁵	832	lb	\$0.22	\$182.95
Labor – spears ⁶	302	lb	\$0.24	\$72.58
Labor – fresh ⁷	1386	lb	\$0.23	\$318.78
Worker housing				\$93.00
Port-a-potties ⁸				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays – application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ⁹				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ¹⁰				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop	1	time(s)	\$12.80	\$12.80

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Asparagus spears, cuts and tips, and fresh market – YEAR 5

	Quantity	Unit	\$/Unit	\$/Acre
Land rent				\$130.00
Interest on operating costs for 4 months ¹¹				\$19.46
Management & supervision labor ¹²	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,523.40

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁴ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁵ Piece rate of \$0.18/lb plus benefits

⁶ Piece rate of \$0.20/lb plus benefits

⁷ Piece rate of \$0.19/lb plus benefits

⁸ Assumes one port-a-potty per 32 acres of asparagus for 2 months

⁹ Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

¹⁰ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹¹ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹² Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015

Asparagus spears, cuts and tips, and fresh market – YEAR 6 TO 11

	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	1320	lb	\$0.76	\$960.04
Spears ¹	480	lb	\$0.88	\$405.55
Fresh market ²	2200	lb	\$0.90	\$1,941.50
TOTAL	4000			\$ 3,307.09
CASH EXPENSES				
Fertilizer				
Soil test ³	0.167	sample(s)	\$16.00	\$2.67
Limestone ⁴	0.375	ton	\$37.00	\$13.88
Limestone application ⁵	0.25	time(s)	\$7.00	\$1.75
Urea (69# actual N)	150	lb	\$0.17	\$25.50
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.21	ton	\$6.50	\$1.37
Pre-harvest spray				
Materials ⁵	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00

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Asparagus spears, cuts and tips, and fresh market – YEAR 6 TO 11				
	Quantity	Unit	\$/Unit	\$/Acre
Spring fern chop ⁶	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	2.82	gal	\$2.16	\$6.09
Truck transport to receiving station ⁷				\$15.60
Labor – cuts & tips ⁸	1320	lb	\$0.22	\$290.40
Labor – spears ⁹	480	lb	\$0.24	\$115.20
Labor – fresh ¹⁰	2200	lb	\$0.23	\$506.00
Worker housing				\$93.00
Port-a-potties ¹¹				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays – application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ¹²				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ¹³				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop ⁵	1	time(s)	\$12.80	\$12.80
Land rent				\$130.00
Interest on operating costs for 4 months ¹⁴			5%	\$25.32
Management & supervision labor ¹⁵	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,884.86

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Gridded soil sampling on a 2-acre grid, or 0.5 samples per acre, every 3 years (0.5/3 = 0.167 samples/acre/year) assessment

⁴ Assumes variable rate application of 1.5 tons of lime every 4 years

⁵ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁶ MSU custom rate for corn stalk shredder

⁷ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁸ Piece rate of \$0.18/lb plus benefits

⁹ Piece rate of \$0.20/lb plus benefits

¹⁰ Piece rate of \$0.19/lb plus benefits

¹¹ Assumes one port-a-potty per 32 acres of asparagus for 2 months

¹² Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

¹³ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹⁴ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹⁵ Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015



Asparagus spears, cuts and tips, and fresh market – YEAR 12

	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	3600	lb	\$0.76	\$2,618.28
Spears ¹	0	lb	\$0.88	\$0.00
Fresh market ²	0	lb	\$0.90	\$ -
TOTAL REVENUE				\$2,618.28
CASH EXPENSES				
Fertilizer				
Soil test ³	0.5	sample(s)	\$16.00	\$8.00
Limestone	1.5	ton	\$37.00	\$55.50
Limestone application	1	time(s)	\$7.00	\$7.00
Urea (69# actual N)	150	lb	\$0.17	\$25.50
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.21	ton	\$6.50	\$1.37
Pre-harvest spray				
Materials ⁴	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00
Spring fern chop ⁵	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78
Cart fuel	2.82	gal	\$2.16	\$6.09
Truck transport to receiving station ⁶				\$15.60
Labor – cuts & tips ⁷	3600	lb	\$0.22	\$792.00
Worker housing				\$93.00
Port-a-potties ⁸				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays – application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ⁹				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ¹⁰				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00

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Asparagus spears, cuts and tips, and fresh market – YEAR 12				
	Quantity	Unit	\$/Unit	\$/Acre
Fall fern chop	1	time(s)	\$12.80	\$12.80
Land rent				\$130.00
Interest on operating costs for 4 months ¹¹			5%	\$24.21
Management & supervision labor ¹²	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,816.35

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Gridded soil sampling on a 2-acre grid, or 0.5 samples per acre

⁴ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁵ MSU custom rate for corn stalk shredder

⁶ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁷ Piece rate of \$0.18/lb plus benefits

⁸ Assumes one port-a-potty per 32 acres of asparagus for 2 months

⁹ Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

¹⁰ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹¹ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹² Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015

Asparagus spears, cuts and tips, and fresh market – YEAR 13				
	Quantity	Unit	\$/Unit	\$/Acre
REVENUES				
Cuts & tips ¹	3200	lb	\$0.76	\$2,327.36
Spears ¹	0	lb	\$0.88	\$0.00
Fresh market ²	0	lb	\$0.90	\$ -
TOTAL REVENUE				\$ 2,327.36
CASH EXPENSES				
Fertilizer				
Limestone	1.5	ton	\$37.00	\$55.50
Limestone application	1	time(s)	\$7.00	\$7.00
Urea (69# actual N)	150	lb	\$0.17	\$25.50
Potash (150# actual K)	250	lb	\$0.17	\$42.50
Boron (1# actual)	10	lb	\$0.62	\$6.20
Delivery & application (reg spread)	2	time(s)	\$6.25	\$12.50
Blending	0.21	ton	\$6.50	\$1.37
Pre-harvest spray				
Materials ³	1	time(s)	\$49.97	\$49.97
Application	1	time(s)	\$8.00	\$8.00
Spring fern chop ⁴	1	time(s)	\$12.80	\$12.80
Harvest				
Cart investment & maintenance				\$40.78

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Asparagus spears, cuts and tips, and fresh market – YEAR 13

	Quantity	Unit	\$/Unit	\$/Acre
Cart fuel	2.82	gal	\$2.16	\$6.09
Truck transport to receiving station ⁵				\$15.60
Labor – cuts & tips ⁶	3200	lb	\$0.22	\$704.00
Worker housing				\$93.00
Port-a-potties ⁷				\$5.60
Beetle sprays	2	time(s)	\$9.54	\$19.08
Beetle sprays – application cost	2	time(s)	\$8.00	\$16.00
Post-harvest spray ⁸				
Materials	1	time(s)	\$45.65	\$45.65
Application	1	time(s)	\$8.00	\$8.00
Fern sprays ⁹				
Materials	4	time(s)	\$21.05	\$84.20
Application	4	time(s)	\$8.00	\$32.00
Fall cover crop				
Rye seed	2	bu	\$7.00	\$14.00
Rye spreading	1	time(s)	\$8.00	\$8.00
Fall fern chop	1	time(s)	\$12.80	\$12.80
Land rent				\$130.00
Interest on operating costs for 4 months ¹⁰			5%	\$22.63
Management & supervision labor ¹¹	7.5	hr	\$32.00	\$240.00
TOTAL EXPENSES				\$1,718.77

¹ Net of revenue minus 2% MACMA assessment and \$0.0175/lb MAAB assessment

² Net of revenue minus \$0.0175/lb MAAB assessment

³ Application of Roundup PowerMax (1X@1qt), Spartan (1X@6oz), generic diuron 80DF (1X@2lb), plus ammonium sulfate adjuvant

⁴ MSU custom rate for corn stalk shredder

⁵ Increased 2009 transport costs by 4%, reflecting 4% increase in federal mileage rate

⁶ Piece rate of \$0.18/lb plus benefits

⁷ Assumes one port-a-potty per 32 acres of asparagus for 2 months

⁸ Application of Roundup PowerMax (1X@1qt), Dual Magnum (1X@1.3pt), generic diuron 80DF (1X@1.5 lb), Formula 40 (1X@1qt), generic metribuzin 75DF (1X@0.75 lb), plus ammonium sulfate adjuvant

⁹ Application of Bravo WeatherStik (4X@1qt), generic tebuconazole 3.6L (2X@6oz), Perm-Up 3.2 EC (4X@4oz), and Sevin XLR Plus (4X@1.5 pt)

¹⁰ Interest was not charged for harvest carts and housing, as interest was already included in ownership costs

¹¹ Assumes 1.4% annual cost over 2009 rates for cost of living increase over period 2010-2015



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Lab Services

Diagnostic services:

Disease, weed, insect and
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517-355-4536
www.pestid.msu.edu

Soil and Plant Nutrient Lab:

Soil testing

Plant and Soil Sciences Building
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East Lansing, MI 48824-1325
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www.spnl.msu.edu

For inquiries regarding non-commercial vegetable production, contact
MSUE's toll-free Lawn and Garden Hotline: 1-888-678-3464 (1-888-MSUE-4MI)



Michigan State University Extension Online Resources

Costs and Returns for Producing Michigan Asparagus (E3315):

<http://bit.ly/asparaguscost>

Disease and Insect Pests of Asparagus (E3219):

<http://bit.ly/asparaguspests>

Midwest Vegetable Production Guide (E0312):

<http://bit.ly/midwestguide>

MSU Extension Bookstore:

<http://shop.msu.edu>

MSU Extension News and Events:

<http://msue.anr.msu.edu/>

Weed Control Guide for Vegetable Crops (E0433):

<http://bit.ly/msuweedguide>



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