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Estimated Costs of Producing Hops in Michigan

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Background

Hops are an essential ingredient in beer production. Brewers use hops for aroma and bittering, which counters the sweetness of malt, another main ingredient. Hops also have preservative qualities.

Commercial hop production began in the United States along the East Coast in the early 1800s, but eventually moved west – first to California, then to the Pacific Northwest. In 2013, more than 35,000 acres of hops were being grown in the United States. Washington State (more than 27,000 acres and 77% of U.S. production), Oregon (more than 4,700 acres and 14%) and Idaho (more than 3,400 acres and 9%) were the leading producers (George, 2014).

Michigan hadn't had a commercial hop yard from sometime in the 1800s until early in the 21st century, when several factors led agricultural producers in Michigan and elsewhere to reconsider hops as a commercial crop (Sirrine, Rothwell, Lizotte, Goldy, Marquie, & Brown-Rytlewski, 2010):

- The dramatic growth in the number of craft breweries
- Increased interest in locally sourced agricultural products
- Years of abundant crops and low prices that led farmers to remove land from hop production, then poor hop yields in 2007 that created a worldwide shortage and caused a price spike

The revival of the Michigan hop industry began in 2008 on the Old Mission Peninsula near Traverse City, where the soil and climate are well-suited to hop production. Since 2008 hop acreage in the state has increased steadily. Michigan is currently ranked fourth in the nation among hop growing states, with more than 400 acres in hop production and eight processing plants in operation.

This increase has been paralleled by tremendous growth in Michigan's craft brewing sector, which contributed more than $1 billion to the state's economy in 2012 (Brewers Association, 2014). The number of breweries in Michigan increased from three in 1991 to more than 140 in 2013. This increase and brewers' desire to purchase locally grown ingredients have helped drive demand for Michigan-grown hops.

If you're considering setting up a hop yard, you (and possibly any agricultural lender you're working with) will need some idea of the potential:

- Costs to prepare and establish an acre of land for hop production
- Annual hop yard operating costs
- Annual return per acre of hop-producing land

This information is readily available for the major hop-producing states. The *2010 Estimated Cost of Producing Hops in the Yakima Valley, Washington* (Galinator, George, & Hinman, 2011) is one such resource. There are significant differences, however, between hop yard

infrastructure costs and returns in those states and in Michigan. This fact sheet provides Michigan-specific information.

Glossary

Beer fermented beverage that is generally made of water; brewer's yeast; a starch such as malt, rice, or sugar; and a flavoring such as hops.

Hop yard field in which hops are grown; also called *hop field, hop garden.*

Hops female flowers of the perennial hop plant (*Humulus lupulus*).

Picking machine stationary machine that is typically housed indoors and used to separate the hops from the bines, leaves, and other material.

Information Sources

In preparing this bulletin we consulted leaders in the Michigan hop-growing industry, hop plant propagators, processors, brewers, and home-brew supply stores. The hop yard establishment costs and annual operating expenses were based on typical quantities and materials reported by the operators of conventional hop yards in 2013. Hourly machine rates were based on those in *Custom Machine and Work Rate Estimates: 2012–2013 Production Season Costs* (Stein, 2012) and on Michigan hop growers' estimates.

Assumptions and Caveats

Because of the variability in land costs in Michigan, this analysis does not include land prices. We assume the productive life of a hop yard is 20 years based on the longevity of the plant itself, although that number may decrease due to factors such as changing market conditions, cultivars falling out of favor, and development and increasing demand for new cultivars. The analysis includes an hourly rate for labor and management that would be charged if growers didn't do the work themselves. Annual costs don't include overhead such as loan interest, taxes, and hop yard depreciation.

A Representative Michigan Hop Yard

Table 1 lists the per-acre land preparation and establishment costs for a 5-acre hop yard, which is a typical entry-level size for a commercial-scale Michigan hop farm.

It takes 1.1 acres of land to establish 1 acre of hops because of the standard trellis design. Michigan hop yard designs vary, but they're typically laid out on a 14-foot by 3.5-foot grid, which equates to roughly 1,000 plants and 80 poles per acre. Drip irrigation is recommended and commonplace in Michigan hop yards.

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Table 1. 2014 Sample Hop Yard Preparation and Establishment Costs Per Acre and Per 5-Acre Yard

Expense	Cost per acre	Cost-per-acre notes	Cost per 5-acre yard
Land preparation			
Discing	$26	$26/acre	$130
Hop yard establishment			
Post holes – digging	313	2.5 hrs @ $125/hr (145 hp tractor)	1,565
Post holes – placement	750	6 hrs @ $125/hr	3,750
Field poles	2,120	53 @ $40/pole	10,600
End poles[a]	1,350	27 @ $50/pole	6,750
Earth anchors	689	53 per acre @ $13 each	3,445
Wire	1,000	Galvanized 7-strand ($800) + #9 ($200)	5,000
Miscellaneous hardware and supplies	500	Staples, hammer, Crosby clips, etc.	2,500
Labor – installing poles	480	4 workers @ 12 hrs each @ $10/hr	2,400
Management	240	12 hrs @ $20/hr	1,200
Hop plants	4,000	$4/plant, 1,000 plants per acre (when planted on a 14' x 3.5' grid)	20,000
Labor – planting	700	70 hrs @ $10/hr	3,500
Irrigation[b]	1,500	Includes installation	7,500
Irrigation well		Variable	
Total initial costs	**13,668**		**68,340**

[a] The number of poles per acre will vary depending on the layout of the hop yard and the overall acreage. A square, 5-acre hop yard would require about 132 end poles and 264 interior poles, which is about 53 field poles and 27 end poles on a per-acre basis. Larger hop yards would generally require fewer poles per acre.

[b] This calculation is based on a system capable of applying unfiltered water at a rate of 50 gallons per minute through a 2-inch main. The cost will vary depending on actual irrigation needs, the number of irrigation zones in the hop yard, and other factors.

Table 2 outlines the estimated annual operating costs and returns per acre in a typical Michigan hop yard.
Hop yields are cultivar-dependent, with full production for 'Cascade', for example, to be at least 1,500 pounds of dried hops per acre. Conservative annual yield estimates for year 1 are negligible; for year 2, 50% production; for year 3, 75%; and for years 4 and 5, 100%. It is assumed that wet hops contain 75% moisture and dried hops 10% moisture.

Current (2014) sales figures for wet wholecone hops are $5 to $6 per pound, for dried wholecone hops $10 to $12 per pound, and for pelletized hops $14 per pound. Because the vast majority of brewers use pelletized hops, the return estimates in Table 2 have only been calculated for pelletized hops.

Table 2. 2014 Sample Hop Yard Annual Operating Costs and Returns Per Acre

Item	Year 1	Year 2	Year 3	Year 4	Year 5
Annual operating costs					
Coir (1 string yr 1; 2 strings yr 2 and beyond $0.20/string; ground clips 1 per string annually $80)	$240	$480	$480	$480	$480
Labor – stringing (5 workers @ 15 hours @ $10/hr)	500[a]	750	750	750	750
Labor – training hop bines	500	750	750	750	750
Pesticides (insecticide, fungicide, herbicide)	400	600	600	600	600
Fertilizer[b]	250	275	275	275	275
IPM consultant[c]	100	100	100	100	100
Repairs, parts and maintenance	250	250	250	250	250
Machinery and labor – stringing	100	100	100	100	100
Machinery and labor – fertilizing	300	400	400	400	400
Machinery and labor – mowing and tilling	100	100	100	100	100
Machinery and labor – spraying	300	350	350	350	350
Annual operating costs subtotals	*3,040*	*4,155*	*4,155*	*4,155*	*4,155*
Harvest[d]					
Labor – harvesting (cutting and loading; 4 workers @ 10 hrs @ $10/hr)	—	400	400	400	400
Management (10 hrs @ $20/hr)	—	200	200	200	200
Machinery use (10 hrs @ $125/hr in each of yrs 2 through 5)	—	1,250	1,250	1,250	1,250
Harvest costs subtotals	—	*1,850*	*1,850*	*1,850*	*1,850*
Post-harvest costs					
Picking and processing fees ($6/lb.) (energy, supplies, labor, etc.)	—	4,500	6,750	9,000	9,000
Transport to processor (variable)	—	500	500	500	500
Interest on equipment (picking machine, hammer mill, pelletizer)[e]	—	—	—	—	—
Sales costs (commission, transportation, shipping, etc.)[e]	—	—	—	—	—
Post-harvest costs subtotals	*0*	*5,000*	*7,250*	*9,500*	*9,500*
Expenses subtotals	**3,040**	**11,005**	**13,255**	**15,505**	**15,505**

Table 2. 2014 Sample Hop Yard Annual Operating Costs and Returns Per Acre *(continued)*

Item	Year 1	Year 2	Year 3	Year 4	Year 5
Gross revenue per acre					
% of total yield (full production 1,500 lbs. dried/acre)	0	50%	75%	100%	100%
Total yield in pounds dried/acre	0	750	1,125	1,500	1,500
Pelletized ($12/lb.–$14/lb.)	0	10,500	15,750	21,000	21,000
Net revenue per acre (gross revenue per acre minus Expenses subtotal)	**(2,790)**	**(505)**	**2,495**	**5,495**	**5,495**

Note. All dollar amounts are rounded to the nearest whole dollar.

[a] Cost is lower in year 1 because only one string is needed per plant.

[b] Fertilizer costs can be significantly more for organic production.

[c] The cost of an IPM (integrated pest management) consultant varies depending on the frequency of scouting.

[d] Harvest costs aren't calculated for year 1 because hop production is generally minimal. Sometimes hops can be harvested in year 1, in which case harvest costs will be incurred.

[e] See the "Assumptions and Caveats" section for what is and isn't included in the calculations.

The calculations in Tables 1 and 2 will vary over time and from farm to farm, depending on factors such as:

- Sale price fluctuations
- Production costs
- Cultivation and harvest practices
- Changes in weather and climate
- Soil type and fertility differences
- Hop yard location
- Fuel costs
- Labor availability and costs
- First-year yields

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For More Information

To find out more about hop production in Michigan, please visit the MSU Extension "Growing Hops in Michigan and the Great Lakes Region" website at **hops.msu.edu**.

References and Resources

Brewers Association. (2014). *Michigan craft beer sales statistics, 2013.* Retrieved from www.brewersassociation.org/statistics/by-state/? state=MI

Galinator, S., George, A., & Hinman, H. (2011). *2010 estimated cost of producing hops in the Yakima Valley, Washington* [FS028E]. Pullman: Washington State University. Retrieved from cru.cahe.wsu.edu/CEPublications/FS028E/FS028E.pdf

George, A. (2014). *USAHOPS 2013 statistical report.* Moxee, WA: Hop Growers of America. Retrieved from www.usahops.org/userfiles/image/1392264516_2013%20Stat%20Pack.pdf

Sirrine, J. R., Rothwell, N., Lizotte, E., Goldy, R., Marquie, S., & Brown-Rytlewski, D. E. (2010). *Sustainable hop production in the Great Lakes region* [E3083]. East Lansing: Michigan State University, MSU Extension.

Southern Research and Outreach Center. (2010–14). *Hops trellis cost calculator* [downloadable spreadsheet]. Waseca: University of Minnesota, Southern Research and Outreach Center. Retrieved from sroc.cfans.umn.edu/People/Faculty/VinceFritz/Hops/index.htm

Stein, D. (2012). *Custom machine and work rate estimates.* East Lansing: Michigan State University, MSU Extension. Retrieved from www.msu.edu/user/steind/2013 Cust_MachineWrk Master 11_27_12.pdf

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