

Estimated Costs of Producing Hops in Michigan



www.bethpricephotography.com

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 (Sirrinc, 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.





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 |
| <i>Annual operating costs subtotals</i> | <i>3,040</i> | <i>4,155</i> | <i>4,155</i> | <i>4,155</i> | <i>4,155</i> |
| 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 |
| <i>Harvest costs subtotals</i> | <i>—</i> | <i>1,850</i> | <i>1,850</i> | <i>1,850</i> | <i>1,850</i> |
| 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 | — | — | — | — | — |
| <i>Post-harvest costs subtotals</i> | <i>0</i> | <i>5,000</i> | <i>7,250</i> | <i>9,500</i> | <i>9,500</i> |
| 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



www.bethpricephotography.com



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
- Sirriner, 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

Acknowledgments

Authors

This fact sheet was written by:

- Rob Sirriner, Community Food Systems Educator, MSU Extension
- Erin Lizotte, IPM Educator, MSU Extension
- Diane Brown, Commercial Horticulture Educator, MSU Extension
- Tom O’Brien, Research Assistant, MSU Extension
- Ashley Leach, Research Assistant, MSU Extension

It was produced by ANR Communications (www.anrcom.msu.edu).

With Thanks

The authors would like to thank the following individuals, businesses, and organizations for their input on this fact sheet:

- Ann George of Hop Growers of America
- Annette Kleinschmit of MSU Extension
- Beau Shacklette of Trickl-Eez
- Patrick Smith of Loftus Ranches
- Empire Hops
- HopHead Farms
- Michigan Hop Alliance
- Sandy Ridge Farms
- Spinniken Custom Farming
- The editorial and design staff of ANR Communications, MSU Extension

Photos © 2014 by Beth Price Photography, www.bethpricephotography.com

This fact sheet was produced with support from a Project GREEN grant: Demonstration, education, and outreach to enhance Michigan’s hops industry (GR13-031).