

# Cost of Production of Machine-Harvested Pickling Cucumbers in Michigan, 2010

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## INTRODUCTION

Michigan ranks first in the nation in production of pickling cucumbers. Michigan produced 188,500 tons of pickling cucumbers in 2009, representing 35 percent of the total U.S. market.

With the increase in use of irrigation in pickling cucumber production areas and improvement in the prices of corn and soybeans, there are profitable options available to producing pickling cucumbers. A goal of this study was to determine the variable costs and potential returns for pickling cucumber production in the field to enable growers to make informed crop selection decisions.

## OBJECTIVES

1. To determine the average variable cost per acre of pickling cucumber production.
2. To provide the information to producers to assist in determining if the profitability of this crop is sufficient to warrant including it in the crop rotation sequence. Should equipment, labor, operator's capital and management be allocated to pickling cucumbers or to another crop?
3. To provide the pickling cucumber industry an updated, unbiased cost of production study and typical budget.

## ASSUMPTIONS

1. This study looked only at variable costs. The study assumed that the machinery and equipment investment was already in place on the farm.
2. To standardize machinery operating costs for each field operation, Michigan State University Extension publica-



tion "2011 Custom Machine and Work Rate Estimates"<sup>1</sup> or Doane's 2009 Machinery Custom Rates<sup>2</sup> publications were used.

3. Interest on operating costs was calculated from the total operating costs at an interest rate of 5 percent for a six-month period.
4. Crop inputs for this budget were based on:
  - a. The predominant practice utilized by the cooperators.
  - b. The average cost/unit for the inputs.
  - c. The average or predominant rate per acre, whichever the data suggested was more relevant.
  - d. Data points that were readily seen as out of the ordinary were not used — for example, if a family member raised bees and charged a rate significantly below that paid by other cooperators.

## METHODS AND PROCEDURES

Ten commercial growers representing 4,800 acres of pickling cucumber production participated. The authors met individually or by phone with each producer to obtain growing costs for the crop.

The costs for each of the inputs in the budget are for material only. Any associated application charge appears in the "Machine and application costs" portion of the budget.

To determine fertilizer costs, the cost of the actual nutrient was calculated for each type of product used to arrive

<sup>1</sup> Dennis Stein, "2011 Custom Machine and Work Rate Estimates," Michigan State University Extension (September 2010). Available at [www.msu.edu/user/steind/index.html](http://www.msu.edu/user/steind/index.html).

<sup>2</sup> Doane Advisory Services, "2009 Machinery Custom Rates" (spring 2010).



at an average price per unit of nutrient. For example, all of the nitrogen sources — liquid, ammonia and dry — were computed to determine the average cost per unit of actual nitrogen.

## ENTERPRISE COST AND RETURNS

**Cover crop:** The predominant practice was to use a cover crop either before planting or after harvest. The most common cover crop was rye. The cost of seed was \$7 per acre.

**Cucumber seed:** Cucumber seeding rate ranged from 57,000 to 92,000 seeds per acre, with the most common rate between 60,000 and 65,000 per acre. The price ranged from \$1.70 to \$2.95/1000 seeds, but the predominant cost was \$2.20/1000. Vlasplik was the most popular variety. Other varieties were Expedition, Sassy, Lafayette, Journey and Wainwright. Average seed cost was \$134.20/acre.

**Fertilizer:** All cooperators utilized nitrogen (N). The rate ranged from 42 to 135 pounds/acre of actual N. The most common rate was 75 pounds of N per acre. It was common to split the N application between preplant and sidedressing applications. About one-third of the cooperators applied some N starter fertilizer at planting. For our calculations, we used the average cost per pound of N (40 cents/ pound) from all sources reported.

Phosphorus (P) fertilizer was applied by all cooperators except one. The average price was 40 cents/pound of  $P_2O_5$  (44 percent P). Potassium (K) was used by eight of the 10 cooperators. The average rate was 90 pounds of  $K_2O$  (83 percent K) per acre. The average price was 51 cents/pound of  $K_2O$ . Other fertilizers used were manganese and boron. Lime was applied when it was recommended by a soil test. On average, it was applied once every 3 years at a rate of 1 ton per acre at a cost of \$30/ton. One-third of the cost was allocated to the cucumber enterprise. Total budgeted fertilizer cost was \$103.90/acre.

**Fungicides:** Costs ranged from \$37.60 to \$105/acre. Costs in this category varied more between producers than costs in any other category. Half of the cooperators had costs exceeding \$63/acre, and half had costs below \$63/acre. Eight of the 10 cooperators used four different materials. Ninety percent of cooperators used Previcure Flex 6SC at a cost of \$9 to \$11.10/pint. Bravo (Equus, Echo) was used by all growers at a cost range of \$4.60 to \$7.88/pint. Tanos was used by 80 percent of cooperators at a cost range of \$1.75

to \$2/ounce. Mancozeb was used by 60 percent of the cooperators at a cost of \$3.20 to \$8.50/pound. The next most common material utilized was Ranman 3.6SC, used by 50 percent of the growers. Some cucumber purchasers reimbursed fungicide costs at rates ranging from 25 cents/paid bushel to 100 percent of the material cost. Other purchasers did not. Fungicide costs do not include any reimbursement from the purchaser of cucumbers. Budgeted total fungicide cost was \$63.46/acre.

**Insecticide:** Two of the 10 cooperators utilized one insecticide application to the crop. Three utilized the seed treatments Farmore DI 400 (Cruiser plus fungicides) at a cost of 18 cents/1000 seeds or D 300 @ 2 cents/1000 seeds. The most common practice was not to apply insecticide to the crop. Budgeted total insecticide cost for this study was \$0/acre. The cost of seed treatment was not included in the cost of the seed.

**Herbicide:** Curbit, at a cost range of \$4.37 to \$6.72/pint, was used by 90 percent of the cooperators. The next most popular materials were Roundup or a generic glyphosate, and Sandea, both utilized by 60 percent of the producers. Glyphosate costs ranged from \$2.50 to \$3.84/quart; Sandea, from \$29.40 to \$41.60/ounce. Command, at a price range of 77 cents to \$1.05/ounce, was the next most popular, with 50 percent of cooperators utilizing it. Budgeted total herbicide cost was \$41.12/acre.

**Tillage:** The most common tillage system was either preplant plowing or deep chiseling followed by field cultivating twice, planting and then cultivating once three to four weeks after planting. Budgeted cost for tillage was \$43.25/acre.

**Irrigation:** Seven of the 10 cooperators irrigated. The average irrigation water application for the season was 3 inches, with a range of 2.5 to 5 inches. Irrigation costs represent electricity for electric pumps. The costs ranged from \$3.16 to \$7.50 per acre-inch depending on location and pumping depth. Budgeted cost was \$18 per acre. A labor charge of \$5 per acre was budgeted to manage the irrigation system throughout the season.

**Pollination:** Pollination was accomplished with leased honeybees. The most common density was one hive for every 2 acres at a cost of \$57/hive. The range was 0.14 to 1.25 hives/acre. This wide range was accomplished by moving bees on the basis of staggered planting dates. The budgeted cost was \$27.50/acre.



**Land rent or land charge:** Eight of the 10 cooperators planted cucumbers on rented land. The irrigated rental rate ranged from \$100/acre to \$165/acre with \$150/acre most common. Two cooperators that rented non-irrigated land paid \$35/acre and \$200/acre. A land charge of \$150/acre was budgeted.

**Interest on operating costs:** To finance operations, operating funds were either borrowed or self-financed. If the funds were self-financed, those funds had an opportunity cost. An operating interest charge was calculated on the basis of total budgeted costs for the year financed for a six-month period at a rate of 5 percent, or \$20.90/acre.

**Harvest:** The predominant custom harvesting rate was \$150/acre, which included the machine and an operator. Leasing only the machine, with the lessee providing the operator, fuel and lube, cost an average of \$92.50/acre. The budgeted amount was \$150/acre.

**Hauling to receiver:** The cost of hauling the harvested crop to the receiver is grower- and location- dependent. Costs ranged from 5 cents to 35 cents/bushel. The most

common rate range was 14 to 20 cents/bushel. The budgeted amount was 17 cents/bushel.

**Machine and application costs:** As mentioned in the assumptions, custom rates were used. Theoretically, the custom rate pays for the machine, depreciation, labor, fuel, lube and insurance.

**Yield:** Yields ranged from 165 to 300 bushels/acre. Dry-land yields were similar to yields from irrigated fields. In fact, some dry-land yields exceeded some of the irrigated yields. The average yield was 207.7 bushels/acre, which was used in the budget.

**Crop price:** Prices ranged from \$3.40 to \$4.90/bushel. Some processors paid for oversize and cull cucumbers; others did not. The average price was \$4.36/bushel, which was used in the budget. There was no price differential for grade in the figures used in the study.

**Net income available to allocate to overhead:** Deducting total expenses from total income left \$41.56/acre earned that could be allocated back to overall farm overhead.

Table 1. Michigan machine-harvested pickling cucumber variable cost of production, 2010.

INPUTS	Unit	Price/unit	Units/acre	Cost/acre
Cover crop seed (rye)	bushel	\$7.00	1	\$7.00
Seed	thousand	\$2.20	61,000	\$134.20
<b>Fertilizer</b>				
Nitrogen (N)	pound	\$0.40	75	\$30.00
Phosphorus (P2O5)	pound	\$0.40	45	\$18.00
Potassium (K2O)	pound	\$0.51	90	\$45.90
Lime (prorated over 3 years)	ton	\$30.00	1	\$10.00
<b>Fungicides</b>				
Previcur Flex 6SC (propamocarb)	pint	\$9.97	1.2	\$11.96
Bravo (chlorothalonil)	pint	\$6.25	4	\$25.00
Tanos 50WG (cymoxanil+famoxadone)	ounce	\$2.00	8	\$16.00
Mancozeb	pound	\$3.60	2.5	\$9.00
Surfactant	fluid ounce	\$0.60	2.5	\$1.50
<b>Insecticides</b>				
None	acre	\$	0	\$
<b>Herbicides</b>				
Roundup (glyphosate)	quart	\$3.75	2	\$7.50
Curbit 3 EC (ethalfluralin)	pint	\$5.52	2	\$11.04
Command 3ME (clomazone)	fluid ounce	\$0.90	6	\$5.40
Sandea 75WG (halosulfuron)	ounce	\$34.36	0.5	\$17.18

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Table 1. Michigan machine-harvested pickling cucumber variable cost of production, 2010 (*continued*).

INPUTS	Unit	Price/unit	Units/acre	Cost/acre
<b>Tillage</b>				
Plow or deep chisel	acre	\$14.00	1	\$14.00
Field cultivate	acre	\$10.00	2	\$20.00
Cultivation	acre		\$9.25	1
				\$9.25
<b>Irrigation</b>				
Energy costs (electricity)	acre-inch	\$6.00	3	\$18.00
Irrigation labor	acre	\$5.00	1	\$5.00
<b>Other expenses</b>				
Bee rental	hive	\$57.00	0.5	\$27.50
Crop consultant or IPM scout	acre	\$	0	\$
Crop insurance (NAP)	acre	\$	0	\$
Land rent or land charge	acre	\$150.00	1	\$150.00
Interest on all operating costs @ 5% for 6 months		\$20.90	1	\$20.90
Disposal of culls	acre	\$0	0	\$0
Other expenses (type _____)	acre	\$0	0	\$0
<b>Harvest</b>				
Custom, including operator	acre	\$50.00	1	\$150.00
Hauling to receiver (cost per bushel)	bushel	\$0.17	207.7	35.31

Table 2. Machine and application costs (custom rates are used for field operation costs.)

INPUTS	Unit	Price/unit	Units/acre	Cost/acre
Plant cover crop	acre	\$2.00	1	\$12.00
Plant cucumbers	acre	\$14.00	1	\$14.00
Apply fertilizer	acre	\$5.00	1	\$5.00
Apply herbicide	acre	\$6.00	1	\$6.0
Apply fungicide	acre	\$6.00	4	\$24.0
Apply insecticide	acre	\$	0	\$
<b>Total variable costs</b>				\$861.64

Table 3. Gross and net receipts from pickle production.

Gross receipts	Unit	Price/unit	Units/acre	Cost/acre
207.7 bushels /acre X \$4.36/bu	acre			\$905.63
<b>Net income available to allocate to overhead</b>				\$43.99/acre

Average yield/acre<sup>3</sup> 2010: 207.7 2009: 234.7 2008: 213.8 2007: 200.4  
 Average price/bu<sup>4</sup> 2010: \$ 4.36 2009: \$ 4.63 2008: \$ 4.87 2007: \$ 3.99

<sup>3</sup> Interviews with participants (October/November 2010).

<sup>4</sup> Interviews with participants (October/November 2010).



Table 4. Total cost and returns for pickling cucumbers — summary.

Gross receipts (207.7 bu/acre @ \$4.36/bu):	\$905.63
Total variable costs	\$861.64
Net income to allocate to overhead	\$43.99
Variable cost per bushel	\$4.15

### Should pickling cucumbers be included in the crop rotation?

One of the objectives of this study was to determine if the profitability of this crop is sufficient to warrant including it in the crop rotation. Several criteria can be used to evaluate which crops to plant:

1. Profitability comparisons between the various crops that can be planted.
  2. Market price volatility.
  3. The prospect for future profits.
  4. Long-term productivity of the soil.
1. Profitability comparisons: Utilizing the 2010 estimated crop budgets<sup>5</sup> for Michigan, we calculated the net income to allocate to overhead for corn yielding 165 bushels/ acre at a price of \$5.34/bushel. This is the average corn price received for farmers in the Illinois Farm Business Management group for the 2010 crop<sup>6</sup>. We used the same procedures to estimate the 2010 profitability of soybeans at a yield of 48 bushels/acre at a price of \$12.03/ bushel. Those results are compared with the numbers for pickling cucumbers below on a per acre basis.

Table 5. Net return for pickling cucumbers, field corn and soybeans in 2010.

	2010 pickling cucumbers	2010 field corn	2010 soybeans
Gross income	\$905	\$881	\$577
Variable costs	\$862	\$535	\$352
Net income to allocate to overhead	\$43.99	\$346	\$225

<sup>5</sup> Dennis Stein, “2010 Estimated Crop Budget,” Michigan State University Extension.

<sup>6</sup> Gary Schnitkey, “2012 Corn and Soybean Budgets,” University of Illinois (July 2011).

The net income to allocate to overhead is the income remaining per acre that is available to offset other cost centers such as general farm repairs, farm vehicles, family living and overhead (insurance and income and real estate taxes). 2010 was a much more profitable year for corn and soybeans than for pickling cucumbers.

2. Market price volatility: Pickling cucumbers are usually grown under contract. This has the positive effect of reducing sales price volatility. A producer normally desires to grow under contract when the contracted price is high enough that there is no incentive to grow a competing crop with more market price volatility. The following are advantages of contracts for growers:

Farmers’ price risk is often reduced because most contracts specify prices in advance.

Inputs and production services are often supplied by the sponsor. This is usually done on credit through advances from the sponsor.

Contract farming often introduces new technology and also enables farmers to learn new skills.

Contract farming can open up new markets that would otherwise be unavailable to small farmers.<sup>7</sup>

Growing under contract can also cause problems for farmers:

Grower inexperience with new crops may result in lower than anticipated yields and returns too low for profit.

Farmers may become indebted because of production problems and excessive advances.<sup>8</sup>

3. The prospect of future profits: The contracted price for pickling cucumbers in 2010 made pickling cucumbers significantly less profitable than the alternative choices of corn and soybeans. If prices for corn and soybeans remain at 2010 levels or higher, those crops will be more profitable than cucumbers.<sup>9</sup>

<sup>7</sup> FAO Ag Series, “Contract Farming,” Bulletin 62321, 2001.

<sup>8</sup> FAO Ag Series, “Contract Farming,” Bulletin 62321, 2001.

<sup>9</sup> Gary Schnitkey, “2012 Corn and Soybean Budgets,” University of Illinois (July 2011).



Table 6. Michigan pickling cucumber yield and price per bushel, 2003-2010.

Year	Acres	Yield (bu)	NASS price/bu
2003	34000	225	\$4.80
2004	35000	205	\$4.92
2005	34000	168	\$4.03
2006	34000	216	\$4.63
2007	30000	230	\$5.52
2008	31000	220	\$5.28
2009	32000	242	\$6.24
2010	31000	266	\$6.00

Table 6 demonstrates the history of the machine-harvested pickling cucumber industry in Michigan. The acreage planted to pickling cucumbers has been stable since 2003. Acreage in Michigan ranged from 35,000 in 2004 to 30,000 acres in 2007 with an average of 32,857 acres. The yield has fluctuated, with a low of 168 bushels/acre to a high of 242 bushels/acre and an average of 215 bushels/acre. Crop prices have been rising slightly — the price in 2003 was \$4.80 per bushel, and in 2009, \$6.24/bushel. Michigan continues to rank No. 1 in the U.S. in acres planted to pickling cucumbers. Growers need to weigh all the factors involved with growing and marketing pickling cucumbers to determine if this crop fits into their crop rotation in the future.

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