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Cost of Producing Broccoli in Western Michigan  
Michigan State University Extension Service  
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and Thomas A. Dudek, Horticulture and Marketing  
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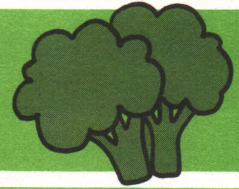
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## COSTS OF

**PRODUCING BROCCOLI**

## IN WESTERN MICHIGAN



By Allen E. Shapley<sup>1</sup>, Edgar L. Strong<sup>2</sup>,  
and Thomas A. Dudek<sup>3</sup>

### Marketing Broccoli

Michigan is seeing an increased interest in the production of cole crops, including broccoli. Factors that potential producers should be aware of include the need for definite market outlets, competition from other production areas and proper postharvest handling procedures.

Marketing considerations begin with identifying a reliable outlet—e.g., wholesale buyer, broker, processor, farm market, etc. Many Michigan broccoli producers have both fresh market and processing outlets. To maintain their markets, growers need to produce both a consistent supply of broccoli and a high quality product.

Broccoli buyers in today's marketplace are increasingly quality conscious. Discussions of quality should center on proper varieties, head and package size, and cooling requirements. Broccoli must be shipped with liquid slush ice (top icing may be acceptable in some markets). Fresh market prices fluctuate in response to quality and to supply and demand. It is therefore important for producers to communicate daily with their markets.

Per capita consumption of fresh broccoli has increased dramatically in the past 10 years. Production nationwide has kept pace with this increase, however, so growers need to maintain quality, have dependable markets and know their costs of production.

Broccoli is an important crop on many vegetable farms in Michigan. The state has the climate and the soils to produce a high quality product, but diseases, pests and local extremes in weather make broccoli a very risky crop that requires extensive horticultural skills. The high cash cost and production problems demand a high level of skill in, and information for, making business management decisions. This report is an attempt to provide some of that necessary information.

The information here can be of value to the broccoli grower making decisions about expanding, reducing or holding constant the broccoli enterprise. Broccoli growers can compare their costs with those given here to get an indication of how efficient they are in producing broccoli compared with a "typical" grower. Vegetable growers can compare the costs given here with the cost of producing other vegetables to determine their enterprise mix. Finally, growers, sellers, processors and buyers will find the information useful in marketing decisions.

### The Typical Farm

Data for this study were developed by bringing together a group of vegetable growers who were willing to share their farm and broccoli enterprise records. Through consensus, a "typical farm" was outlined, with the size, investments and costs representative of vegetable growers in western Michigan. These data were then compared with data supplied by input suppliers, specialists and studies done in other states. The resulting information provided here is a "best estimate" and will therefore vary from figures found on any particular farm.

Our typical farm has the following statistics:

- 120 total acres, of which 80 acres are tillable.
- Most or all of the 80 acres are in intensive vegetable production, with 20 acres in broccoli.

- The broccoli yields 7,000 lb per acre with 70 percent of the crop going to the fresh market and 30 percent to the processing market.

### Structuring The Cost

The various costs included in this study are divided into two categories: fixed and variable. Fixed costs include those that vary little, if any, with the amount produced on the farm, such as property taxes and interest on investment. Variable costs include those that vary more directly with production, including hired labor, fuel, fertilizer, pesticides, etc.

#### FIXED COSTS

Table 1 lists the machinery and equipment complement needed to operate our 120-acre farm. An annual depreciation is calculated for this machinery. "Average value" is also calculated for use in determining another fixed cost, interest on investment.

Table 2 shows the investments in land, buildings and improvements for our typical farm. Again, the depreciation is determined for the buildings and improvements and average value calculated so as to determine interest on investment.

Table 3 brings together those costs associated with machinery, equipment, land, buildings and improvements outlined in Table 1 and 2 and also illustrates the other fixed costs associated with operating a vegetable farm of this size. At the bottom of Table 3 is "total fixed costs per tillable acre." In calculating this figure, we assume that the total fixed costs of operating this farm are to be spread across the productive acres on the farm. There are many ways that the fixed costs of a farm business can be distributed to those enterprises of the business that are producing income. When all or most of the total tillable acres are devoted to similar types of enterprises, such as intensive vegetables, figuring cost per tillable acre is a common and relatively accurate distribution method. The annual fixed costs associated with the

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Table 1. Machinery and equipment costs for broccoli production  
Western Michigan, 1986

Item	New Price	Salvage Value <sup>1</sup>	Average Value <sup>2</sup>	Annual Depreciation <sup>3</sup>
<b>TRACTORS</b>				
60 H.P. Diesel (2 tractors)	\$38,000	\$18,000	\$28,000	\$2,000
30 H.P. Gas	10,000	3,000	6,500	700
I.H. Model BN (fork lift)	7,000	4,000	5,500	300
<b>TILLAGE</b>				
Plow	6,000	1,000	3,500	500
Harrow	1,300	100	700	120
<b>PLANTING</b>				
Transplanter	4,000	2,000	3,000	200
Drill	5,000	1,000	3,000	400
Fertilizer spreader	1,200	200	700	100
Sidedresser (old)	500	500	500	--
<b>CROP MAINTENANCE</b>				
Cultivator	3,000	1,000	2,000	200
250 Gal. Sprayer	2,500	500	1,500	200
3 Pt. Sprayer	1,500	500	1,000	100
Irrigation Equipment	12,000	2,000	7,000	1,000
<b>HARVEST</b>				
40 Bulk Boxes	1,300	100	700	120
Trailer	1,000	400	700	60
<b>PACKING AND COOLING</b>				
Conveyor, etc.	6,000	1,000	3,500	500
Refrigeration	5,000	1,000	3,000	400
<b>MISCELLANEOUS</b>				
Trucks (3)	28,000	4,000	16,000	2,400
Fuel tanks	200	200	200	--
Tools, parts	5,000	2,000	3,500	300
<b>TOTALS</b>	<b>\$138,500</b>		<b>\$90,500</b>	<b>\$9,600</b>

<sup>1</sup>A 10 year life is assigned to all machinery and equipment.

<sup>2</sup>Average value is calculated to create a basis for determining interest on machinery and equipment investment and a repair charge (see Table 3). When determining this value for a specific farm use an estimated market value of the machinery and equipment on that farm.

<sup>3</sup>Annual Depreciation =  $\frac{\text{New Price} - \text{Salvage Value}}{10}$

Table 2. Land, buildings and improvement costs for a typical farm producing broccoli  
Western Michigan, 1986<sup>1</sup>

Item	New Price	Salvage Value	Average Value	Annual <sup>2</sup> Depreciation
Land (120 A)	\$120,000	\$ ---	\$120,000	\$ ---
Packing/Storage Shed	20,000	5,000	12,500	600
Cooling Room	12,000	2,000	7,000	400
2 Water Wells	8,000	0	4,000	320
<b>TOTALS (Bldgs. and Improvements Only)</b>	<b>\$40,000</b>		<b>\$23,500</b>	<b>\$1,320</b>

<sup>1</sup>"Typical Farm" consists of 120 acres total with 80 acres tillable and 20 acres of that 80 in broccoli production.

<sup>2</sup>A 25 year life was assigned to all Buildings and Improvements.

Table 3. Fixed costs for the farm and per acre of broccoli  
Western Michigan, 1986

Item	Cost	Your Farm
<b>Depreciation</b>		
Bldgs. & Improv. (from Table 2)	\$1,320	\$ _____
Mach. & Equip. (from Table 1)	9,600	_____
Total Depreciation	\$10,920	\$ _____
<b>Interest<sup>1</sup></b>		
Land (\$120,000 x 5%)	\$6,000	\$ _____
Bldg. & Improv. (\$23,500 x 10%)	2,350	_____
Mach. & Equip. (\$90,500 x 10%)	9,050	_____
Total Interest	\$17,400	\$ _____
<b>Repairs &amp; Maintenance<sup>1</sup></b>		
Bldgs. & Improv. (\$23,500 x 3%)	\$ 705	\$ _____
Mach. & Equip. (\$90,500 x 10%)	9,050	_____
Total Repairs	\$ 9,755	\$ _____
<b>Taxes</b>		
Real Estate	\$ 3,600	\$ _____
<b>Insurance</b>		
Prop., Mach. & Equip.	\$ 900	\$ _____
Vehicles (inc. license)	540	_____
Total Insurance	\$ 1,440	\$ _____
<b>TOTAL FIXED COST (farm)</b>	<b>\$43,115</b>	<b>\$ _____</b>
<b>TOTAL FIXED COST PER ACRE TILLABLE ACRE</b> ( $\$43,115 \div 80 \text{ acres}$ ) <sup>2</sup>	<b>\$ 539</b>	<b>\$ _____</b>

<sup>1</sup>The investments cited in this section are taken from Tables 1 and 2.

<sup>2</sup>The fixed costs are distributed over the 80 acres that are producing income.

Table 4. Variable costs per acre for broccoli production  
Western Michigan, 1986

Item	Am't/Acre	Price	Cost/Acre
<b>GROWING</b>			
Plants	12,000	\$40.00/1,000 (Plugs) <sup>1</sup>	\$480.00
Fertilizer N	200 lbs.	.24	48.00
P	120 lbs.	.21	25.20
K	200 lbs.	.12	24.00
Solubor	2 lbs.	3.15	6.30
Limestone	1/2 ton	15.00	7.50
Fungicide - Bravo	1 qt. (5X)	25.00 gal.	31.25
- Kocide	2 lb. (4X)	2.15	17.20
Insecticides - Pydrin	4 oz. (3X)	15.40 pt.	11.55
- Lorsban	50 oz. (1X)	42.60 gal.	16.65
- Monitor	1 pt. (1X)	65.00 gal.	8.13
Herbicide - Treflan 4EG	1 qt.	34.50 gal.	8.60
Cultural labor - Prep. <sup>2</sup>	5 hrs.	5.50	27.50
- Planting	20 hrs.	4.50	90.00
- Hoeing	8 hrs.	4.50	36.00
- Cultivation	.3 hrs.(3X)	5.50	4.95
- Irrigation	7 hrs.	4.50	31.50
- Spraying	.3 hrs.(7X)	5.50	11.55
- Fringe benefits	15% of payroll		30.23
Fuel, oil			60.00
Utilities			10.00
Interest on Oper. Cap.		\$986.11 x 12% x .5 yr.	59.17
<b>HARVESTING, MARKETING</b>			
Labor - Harvest	7,000 lbs.	.05 lb.	350.00
- Packing (70% of crop)	245 boxes	.75	183.75
- Fringe benefits	15% of payroll		80.06
Supplies - pkgs. (for 70% of crop)	245 boxes	1.00	245.00
- ties			8.00
Cooling	245 boxes	.50	122.50
Brokerage	15% of fresh market gross <sup>3</sup>		257.25
Transporting	7,000 lbs.	\$.008	56.00
<b>TOTAL VARIABLE COST PER ACRE</b>			<b>\$2,347.84</b>

<sup>1</sup>The use of bareroot plants is also common at \$25/1,000.

<sup>2</sup>Does not include the cost of producing a cover crop but a cover crop planted the previous fall is recommended.

<sup>3</sup>Fresh market gross receipts = 7,000 lbs. x 70% x \$.35/lb = \$1,715.

operation of a typical vegetable farm with 80 acres of intensive crops are estimated to be \$539 per acre of vegetables grown.

### VARIABLE COSTS

Table 4 includes the variable costs associated with the production of broccoli. The costs are given on a per acre basis, with the per acre costs based on the production of 20 acres. The amounts of inputs listed in Table 4 do not necessarily reflect recommendations by Cooperative Extension Service specialists. Instead, they represent grower practices.

One item in Table 4 needs explanation: interest on operating capital. Regardless of whether a grower borrows operating money to plant and grow the crop or takes it out of savings, a charge must be made for its use. Interest is charged on the growing costs but not on the harvesting and marketing costs, because it is assumed that the

latter will be paid from receipts as they occur. On many farms, this is not the case because the receipts come in long after harvest. On such farms, interest should be charged to the total variable costs rather than to the growing costs alone. As shown in Table 4, the variable costs per acre of broccoli for a 20-acre "typical" enterprise total \$2,347.84 per acre.

### TOTAL COSTS AND RETURNS

Table 5 brings together the variable costs and the fixed costs for growing broccoli and compares these costs with typical gross receipts. These costs are calculated both on a per acre basis and a per pound of product basis.

The figures in Table 5 indicate that this typical broccoli enterprise was not profitable. Using the per pound figures, we can see that the price per pound just covered the variable costs, with only 1.5 cents left over to cover fixed costs. Of course, on a particular

farm the yield may be higher, the price may be higher or the costs may be lower than those on the typical farm. If any of these situations were to exist, the crop could show a profitable return. On the other hand, it is possible that on a particular farm the costs could be higher, the yield lower or the price lower, resulting in an even greater loss than that shown in Table 5.

Another way of evaluating the costs and returns in Table 5 is to calculate what price would be needed at the given yield to cover all costs and/or to calculate what yield would be needed at a given price to cover all costs. These are called break-even values. In this situation, the break-even price would be the price that equals the total cost, which is 41.2 cents. The break-even yield given our 35 cents price would be 8,248 lbs.

Table 5. Per acre and per pound costs and returns of broccoli production  
Western Michigan, 1986

Item	Per Acre	Per Pound
Price		\$ .35
Gross receipts per acre (7000 lb.)	\$2,450	
<b>VARIABLE COSTS</b>		
Growing		
Plants	\$ 480.00	\$.069
Fertilizer and lime	111.00	.016
Spray and Dust	93.38	.013
Cultural labor	231.73	.033
Fuel, Oil	60.00	.009
Utilities	10.00	.001
<b>Total Growing</b>	<b>\$ 986.11</b>	<b>\$.141</b>
Interest on Oper. Capital	59.17	.008
<b>Total Growing + Interest</b>	<b>\$1,045.28</b>	<b>\$.149</b>
Harvesting and Marketing		
Labor	\$ 613.81	\$.088
Packages, supplies	253.00	.036
Cooling	122.50	.018
Brokerage	257.25	.037
Transportation	56.00	.002
<b>Total Harvesting, Mktng</b>	<b>\$1,302.56</b>	<b>\$.186</b>
<b>TOTAL VARIABLE</b>	<b>\$2,347.84</b>	<b>\$.335</b>
<b>FIXED COST</b>		
Depreciation	\$ 136.50	\$.02
Interest on Investment	217.50	.031
Repairs and Maintenance	122.00	.017
Taxes	45.00	.006
Insurance	18.00	.003
<b>TOTAL FIXED</b>	<b>\$ 539.00</b>	<b>\$.077</b>
<b>TOTAL COST (Var. + Fixed)</b>	<b>\$2,886.84</b>	<b>\$.412</b>
Net Return (loss)	\$ -436.84	\$-.062

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