MSU Ag Facts — Extension Bulletin E-1752, December 1983 (new), $1.00

The Cost of Producing Celery in West Central Michigan

by ALLEN E. SHAPLEY
Farm Management Specialist
Department of Agricultural Economics

MICHIGAN ranks third in the nation in the production of celery, a position it has held for over 15 years. Michigan's percentage of total U.S. production has grown slowly over time. In 1964, Michigan produced 5.8% of the nation's celery, and by 1982 this figure was 8.1% or 1,551,000 cwt.

The climate in Michigan is conducive to the production of very high quality celery for both fresh and processed markets. However, diseases, pests and local extremes in weather make celery a high risk crop that requires a high level of horticultural skills. The recent increase in input prices relative to product price also demands higher levels of skill in, and information for, practicing farm business management if growing celery is to remain profitable. This report is an attempt to provide some of that needed information.

Data Gathering Procedure

Information was gathered from West Central Michigan celery growers, Michigan Celery Promotion Cooperative staff, farm input suppliers and Cooperative Extension Service personnel. Most data were gathered through small group discussions with growers reaching consensus on the items discussed. A "typical"-sized celery operation for the area was agreed upon and investment and cost data were estimated for that size farm. Other data were reviewed by growers for accuracy and relevance before inclusion.

Uses of the Study

This report should be of value in a number of situations. For the grower producing celery plus other crops, it may aid in the decision to expand, reduce or hold constant the celery enterprise. Celery growers can compare their costs with those given here, and get an indication of how efficient they are in producing celery relative to a "typical" grower. Growers, sellers, processors and buyers may find the information useful in marketing decisions. Finally, growers considering the addition of celery to their business, can compare information in this report with similar information on their other enterprises to determine the relative profitability of one to the other.

CAUTION: Figures given here are consensus estimates for a "typical" farm and will vary from those found on any particular farm. For example: since no two farms would have the identical line of machinery with identical age, this report presents a representative line of machinery at average value. In this way, the figures used are a "best estimate" and should be used accordingly.

Structuring the Costs

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.

On farms with more than one enterprise, the allocation of the fixed costs to the various enterprises can involve difficult and somewhat arbitrary decisions. This was not a serious problem here, since much of the data came from farms that produce and package celery only, so our typical farm is a one-enterprise operation. Therefore, all fixed costs in this study could be charged directly to that one enterprise.

At the end of the report, the 1982 Michigan figures are compared with those for producing celery in Florida. Since Florida cost categories are different from those used in Michigan, the Michigan data were recategorized to fit the Florida model when making that comparison.

Underlying Assumptions

Assumptions made in the development of this study:

- The typical farm is located in West Central Michigan and consists of 80 acres (of which 50 are muck soil) devoted to celery production each year, with the remaining acres in roads, buildings and wasteland.
- A practice of 10% double cropping is followed, resulting in 55 acres of celery grown each year.
- The farm carries sufficient greenhouse space, packing facility and machinery to grow, harvest and pack 55 acres of celery.
- The "double rooting" system is used for growing plants in the greenhouse.
- The values used for buildings and equipment reflect, as near as possible, the average value $\left(\frac{\text{new price + salvage value}}{2}\right)$ of each item.
- The first five acres planted are provided with frost protection.

Farm Investment Costs

Tables 1 and 2 present the investment items for the typical celery farm and the annual depreciation costs for those items. Table 3 presents all the fixed costs, including depreciation, associated with the investment items. These fixed costs, sometimes referred to as ownership costs, are incurred whether or not a crop is produced. The one exception is the machinery maintenance cost, which is affected by both amount of use and ownership.

MACHINERY AND EQUIPMENT COSTS FOR CELERY PRODUCTION

Table 1. 80 Acre Assumed Farm (50 A. Tillable) West Central Michigan 1983

Item	New Price	Salvage Value	Average Value@	Annual Depreciation@@
TRACTORS				
80 H.P. diesel	$26,000	$10,000	$18,000	$1,600
60 H.P. diesel	19,000	9,000	14,000	1,000
40 H.P. diesel	15,000	7,000	11,000	800
40 H.P. gas (old)	2,500	2,500	2,500	-
30 H.P. gas (old)	1,500	1,500	1,500	-
A.C.Model G (old)	1,500	1,500	1,500	-
Small crawler (old)	5,000	5,000	5,000	-
I.H. Model BN (fork lift)	7,000	4,000	5,500	300
TILLAGE				
4-16" plow	9,000	1,200	5,100	780
12' disc	5,000	500	2,800	450
Spring tooth drag (old)	200	200	200	-
Cultipacker	2,500	500	1,500	200
Subsoiler	2,600	600	1,600	200
6'rototiller	3,500	800	2,200	270
12' land leveler	4,000	1,000	2,500	300
PLANTING				
Transplanters(2)	4,000	2,000	3,000	200
2 row corn planter (old)	500	500	500	-
3 pt. fertilizer spreader	1,000	500	800	50
2 row side dresser	500	500	500	-
CROP MAINTENANCE				
6 row cultivator	3,000	1,000	2,000	200
Small cultivator (old)	200	200	200	-
250 gal. sprayer	2,500	500	1,500	200
3 pt. sprayer	1,500	500	1,000	100
Wire hoops	2,200	-	1,100	220
Irrigation system	12,000	2,000	7,000	1,000
Irrigation trailer	750	250	500	50
HARVEST				
Harvester	12,000	5,000	8,500	700
Wagons (4)	6,000	2,000	4,000	400
GREENHOUSE EQUIPMENT	12,000	2,000	7,000	1,000
PACKING				
Conveyors	$ 5,000	$ 1,000	$ 3,000	$ 400
Waste disposal	5,000	1,000	3,000	400
Strapping mach.	6,800	2,000	4,000	480
Blower	1,500	500	1,000	100
200 bu. spreader (2)	13,000	1,000	7,000	1,200
MISCELLANEOUS				
4 WD pickup	10,000	1,000	5,500	900
2 T stake truck (old)	500	500	500	-
Power shop tools	4,000	1,000	2,500	300
20 KW generator	3,000	2,000	2,500	100
5'ditch mower	3,500	1,500	2,500	200
6' 3 pt. blade	700	300	500	40
Fuel tanks	200	200	200	-
Tools, parts	500	500	500	-
TOTALS	$216,150		$145,200	$14,140

@/ A 10 year life was assigned to all machinery and equipment.

@@/ Determined by adding new price and salvage value and then dividing sum by 2.

Table 2. LAND, BUILDINGS AND IMPROVEMENT COSTS FOR CELERY PRODUCTION
80 Acre Assumed Farm (50 A. Tillable) West Central Michigan 1983

Item	New Price	Years of Life	Salvage Value	Average Value	Annual Depreciation
Land (80 A)	$275,000			$275,000	---
Tile (50 A)	50,000	25	0	25,000	$2,000
Greenhouse (10,000 sq ')	13,000	20	$2,000	7,500	550
Greenhouse Beds	10,000	20	0	5,000	500
Packing Shed (4,800 sq ')	23,000	25	5,000	14,000	720
3 Water Wells1/	12,000	25	0	6,000	480
TOTALS	$383,000			$332,500	$4,250
TOTALS (Bldgs. and Improvements only)	$108,000			$ 57,500	$4,250

1/ Water wells are 6" x 200 ' to supply greenhouse, packing shed and irrigation system.

Table 3. FIXED COSTS FOR CELERY PRODUCTION
80 Acre Assumed Farm (50 A. Tillable) West Central Michigan 1983

Item	Cost		Cost/Acre1/	Your Farm	
DEPRECIATION					
Bldgs. & Improv. (from Table 2)	$ 4,250			$	
Mach. & Equip. (from Table 1)	14,140				
Total Depreciation		$18,390	$ 334		$
INTEREST					
Land ($275,000 x 5%)	$13,750			$	
Bldgs. & Improv.($57,500) x 10%)	5,750				
Mach. & Equip. ($145,200 x 10%)	14,540			$	
Total Interest		$34,020	$ 619		$
REPAIRS					
Bldgs. & Improv. ($57,500 x 3%)	$ 1,725			$	
Mach. & Equip. ($145,200 X 10%)	14,520			$	
Total Repairs		$16,245	$ 295		$
TAXES					
Real Estate		$ 5,950	$ 108		$
INSURANCE					
Prop., Mach. & Equip.	$ 1,800			$	
Vehicles (inc. license)	660				
Total Insurance		$ 2,460	$ 45		$
TOTAL FIXED COST		$77,065	$1,401		$

1/ "per acre" figures based on 55 acres (50 acres + 10% double cropping).

Table 4. VARIABLE COSTS PER ACRE FOR CELERY PRODUCTION
80 Acre Assumed Farm (55 A. Celery) West Central Michigan 1983 1/

Item	Am't/Acre	Price	Cost/Acre
GROWING			
Seed	.20 lb.	$35/lb.	$ 7
Fertilizer			
-Gr. House-mix	10 lb.	$225/T	$ 1
-Field-N	160 lb.	.24/lb.	38
-P	450 lb.	.20/lb.	90
-K	200 lb.	.12/lb.	24
Spray and Dust			
-Gr. House-Bravo	12 oz.	$30/gal.	$ 3
-Field-Insecticide	8 apps.	2/	182
-Fungicide	8 apps.	"	56
-Herbicide	3 apps.	"	43
Cultural Labor			
-Gr. House-Prep.	1.5 hr.	$4.50/hr.	$ 7
-Seeding	.9 hr.	5.00/hr.	5
-Transplant.	25.0 hr.	4.50/hr.	113
-Caring	8.7 hr.	4.50/hr.	39
-Field-Prep.	4.0 hr.	5.00/hr.	20
-Planting	24.0 hr.	4.50/hr.	108
-Irriga.	5.0 hr.	4.50/hr.	23
-Cult., Spray	8.0 hr.	5.00/hr.	40
-Fringe Ben.	15% of payroll		$ 53
Equip. Operation			
-Fuel	79 gal.	$1.25/gal.	$ 99
-Oil	2 gal.	$210/55 gal.	8
-Hyd. fluid	1 gal.	290/55 gal.	5
Supplies			
-Plastic (Gr. House)	5 roll @ $70/roll		$ 6
-Paper (frost protection)	3 rolls/A @ $40/roll on 5 A		11
Utilities			
-Gr. House	$6400 for the season ÷ 55 A		$116
-Packing shed	$525 for the season ÷ 55 A.		10
Interest on Oper. Cap.	$1107 (Grow. Cost) 13% x .5 yr.		72
HARVESTING, MARKETING			
Equip. Operation	9 gal.	$1.25/gal.	11
Supplies (cartons)	750	1.10/carton	825
Labor			
-Harvesting	16 hrs.	$5.00/hr.	80
-Packing	105 hrs.	4.50/hr.	473
-Fringe Ben.	15% of payroll		83
Sales Commission	750 crates	8% x $6.50 prices	390
Marketing (Net)	750 crates	$ .04/crate	30
Cooling	750 crates	.60/crate	450
Research	750 crates	.0075/crate	6
TOTAL VARIABLE COST PER ACRE			$3527
TOTAL FIXED COST PER ACRE (from Table 3)			1383
		TOTAL COST PER ACRE	$4910

1/ Figures based on 55 A. due to 50 A. tillable + 10% double crop.

2/ An assort. of chemicals were used.

Table 5. WORKSHEET FOR CALCULATING COSTS PER ACRE of Celery on Your Farm

Total Fixed Cost Per Acre

Step 1. Calculate the DIRTI 5 costs for your total farm using Tables 1, 2 and 3 as reference. Total fixed cost for your farm. $________

Step 2. Multiply the figure in Step 1 by the percent you want to charge to the celery enterprise.
Total fixed costs charged to celery enterprise. $________

Step 3. Divide the figure in step 2 by acres of celery in the celery enterprise. TOTAL FIXED COST PER ACRE. $________

Total Variable Costs Per Acre (Use Table 4 as a reference.)

Item	Total Cost for Celery Enterprise	Cost Per Acre (Col. 1 ÷ Acres of Celery)
Seed	________	________
Fertilizer	________	________
Spray, dust	________	________
Labor; cultural	________	________
Fuel, oil; growing	________	________
Machinery repair 1/	________	________
Supplies; growing	________	________
Utilities	________	________
Int. on oper. cap.	________	________
Fuel, oil; harvest	________	________
Supplies; harvest	________	________
Labor; harvest	________	________
Sales comm.	________	________
Marketing (net)	________	________
Cooling	________	________
Research	________	________
Miscellaneous	________	________

TOTAL VARIABLE COST PER ACRE $________

TOTAL FIXED AND VARIABLE COST PER ACRE $________

1/ Include only if you have not included it in the fixed costs.

It was considered fixed here, but growers using this study to compare their own costs may wish to include machinery maintenance costs in the variable costs.

When fixed or ownership costs are calculated, some costs are often forgotten, especially noncash items. To help remember what costs should be included, list the first letter of each category in Table 3 — Depreciation, Interest, Repairs, Taxes, Insurance. Then it is only a matter of remembering what the letters stand for in the DIRTI 5.

Certain costs in Table 3 are noncash in that the farm business must cover them if it is to remain competitive and viable, but they are not cash expenses. These include depreciation and interest on owner's equity.

On our typical farm, the fixed costs total $77,065 or $1,401 per acre of celery produced. If this farm had no debts (investment = owner's equity) the cash fixed costs that must be paid — regardless of whether anything was produced — are $24,655 or $449 per acre of potential production.

Variable Costs

The costs that vary with production are presented in Table 4. The per acre figures were arrived at in various ways. For some items, such as labor cost for cultivating, farmers knew the time required per acre and that figure was multiplied by an average hourly wage. For other items, such as fuel, the annual amount used on each of a number of farms was recorded; then each was divided by acres grown on that farm, and an average fuel per acre was calculated. Still other items were determined by comparing university recommendations with farmers' records. The total variable costs on the typical farm amount to $3,527 per acre.

Table 4 can be used to decide whether to produce a crop. Unless the grower can be certain that crop revenues will at least cover the variable costs, it would be better to leave the land idle. Once the crop is planted and grown, the grower's decision of whether to harvest would logically be based not on total variable costs but instead only on those variable costs associated with harvesting and marketing.

"Your Farm" Costs

For the present grower, Table 5 will assist in pulling together and calculating the per acre cost of production. The figures may be pulled from farm records and/or income tax records. If no figures are available for some items, the relevant figures in this study can be substituted.

The grower need not break down costs exactly as suggested here. For example, if the total fuel bill for the year is known, it is not necessary to divide it into growing and harvesting. Such a breakdown is only necessary in determining what portion of the total cost goes to growing vs. harvesting, etc.

A grower's per acre costs for certain items may vary considerably from those in the study. Many of these differences may be explained by the specific situation and are not a result of management. However, if any one cost is higher, or the total costs are considerably higher than those in this study, they should be analyzed carefully to see if they can be lowered in some way without lowering yields.

Total Costs: Per Acre and Per Crate

Table 6 presents the variable and fixed costs for the typical farm on a per acre and per crate basis at three yield levels: 600, 750, and 900 crates per acre. The figures indicate that at 600 crates, returns did not cover total costs in 1983. However, at all three yield levels, price was greater than total variable costs. This indicates that farmers lost less by producing than by leaving the land idle. For example, at the 600-crate yield, variable costs ($3,123 per acre) were covered, and there was enough additional return ($1,305) to cover most of the fixed costs ($1,401). This situation, though common, cannot continue to exist for many years without serious financial difficulties.

In itemizing the costs of producing the 55 acres of celery, no charge is included for management. The growers who provided raw data for the study felt that since they were so involved in the labor aspect of the business, they could not place a price on their management input. Therefore, any returns above total costs can be viewed as a return to management.

On our typical farm, at 750 and 900 crates there was a return above total costs. This return at the 750-crate yield was $607 per acre, or for the 55-acre enterprise, the return to management was $33,385. For the 600-crate yield, the return to management would be negative.

One or more of three factors must change if a negative return is to be eliminated: an increase in yield, an increase in price or a decrease in cost. Given the figures presented here, the farm would just break even at about 650 crates per acre. The price paid per crate necessary to break even is $7.54 at the 600-crate yield, $6.57 at the 750-crate yield and $5.93 at the 900-crate yield. If the farm were to break even by lowering costs, costs would have to be lowered by $.16 per crate when producing 600 crates per acre.

Comparing Michigan with Florida

Florida's celery production is different from Michigan's in many ways, but since Florida celery supplies many of the same markets as Michigan celery, it may be useful to compare their figures with ours. Table 7 makes this comparison, but one important inconsistency should be pointed out. Florida data are averages taken directly from the records of a few growers while Michigan figures represent a consensus of growers.

In spite of this inconsistency, the figures can be useful indicators for comparing costs across states. It is interesting to note that the total operating costs are similar in the two states, but there are major differences in the fixed costs. This reflects a much higher investment in land, buildings and equipment in Michigan than in Florida.

Yield is influenced by management but is also strongly dependent on weather. Timing and attention to details can influence price, but forces outside the farm are major determinants. Costs are influenced by weather and other outside forces, but many can be influenced greatly by management. This is evidenced by farm records that show farms with similar yields having widely varying costs for such items as chemicals, labor and utilities. Given the present prices for celery, growers must be extra concerned about cost control if they are to survive.

Table 6. PER ACRE AND PER CRATE COSTS OF CELERY PRODUCTION
At Three Yields, West Central Michigan, 1983

Item	600 Crates/A Per Acre	600 Crates/A Per Crate	750 Crates/A Per Acre	750 Crates/A Per Crate	900 Crates Per Acre	900 Crates Per Crate
Price		$7.38		$7.38		$7.38
Gross income per acre	$4,428		$5,535		$6,642	
GROWING COSTS						
Seed	$ 7	$ .01	$ 7	$ .01	$ 7	$ .01
Fertilizer	153	.26	153	.20	153	.17
Spray and dust	284	.47	284	.38	284	.32
Cultural labor	408	.68	408	.54	408	.45
Fuel, oil	112	.19	112	.15	112	.12
Supplies	17	.03	17	.02	17	.02
Utilities	126	.21	126	.17	126	.14
Total Growing	$1,107	$1.85	$1,107	$1.47	$1,107	$1.23
Int. on Oper.Cap.(13%-6 mo.)	72	.12	72	.10	72	.08
Total Grow. + Int.	$1,179	$1.97	$1,179	$1.57	$1,179	$1.31
HARVESTING & MKTG. COSTS						
Fuel, oil	$ 10	$ .02	$ 11	$ .01	$ 12	$ .01
Containers, supplies	660	1.10	825	1.10	990	1.10
Labor	572	.95	635	.85	700	.78
Cooling	360	.60	450	.60	540	.60
Mktg, selling, research	342	.57	426	.57	513	.57
Total Harv., Mktg.	$1,944	$3.24	$2,348	$3.13	$2,755	$3.06
Total Variable	$3,123	$5.21	$3,527	$4.70	$3,934	$4.37
FIXED COST						
Depreciation	$ 334	$ .56	$ 334	$ .45	$ 334	$ .37
Int. on investment	619	1.03	619	.83	619	.69
Repairs & maintenance	295	.49	295	.39	295	.33
Taxes	108	.18	108	.14	108	.12
Insurance & lic.	45	.08	45	.06	45	.05
Total Fixed	$1,401	$2.34	$1,401	$1.87	$1,401	$1.56
TOTAL COST (Var. + Fixed)	$4,524	$7.54	$4,928	$6.57	$5,335	$5.93
Net Return	$ -96	$ -.16	$ 607	$ .81	$ 1,307	$ 1.45

Table 7. COMPARISON OF COSTS AND RETURNS PER ACRE OF CELERY Between Michigan and Florida 1982

Item	Central Florida		Everglades Florida		Michigan	
Yield (crates)	566		516		750	
Price	$ 7.71		$ 6.59		$ 6.50	
Gross Income/A.	$4,364		$3,400		$4,875	
Operating Costs						
Seed	$ 99		$ 122		$ 6	
Fertilizer	198		288		150	
Spray and dust	180		390		256	
Cultural labor	380		646		394	
Machine hire	65		41		39	
Gas, oil, grease	55		117		98	
Repairs and maintenance	237		178		295	
Int. on prod. cap.	119		160		76	
Misc. expense	268		103		143	
Total Operating Costs		$1,601		$2,045		$1,457
Fixed Costs						
Land rent	$ 99		$ 215		$ 332	
Depreciation	54		76		334	
License and Insur.	94		159		45	
Interest on investment	8		11		442	
Total Fixed Costs		$ 255		$ 461		$1,153
Harvesting and Marketing Costs						
Cutting and packing	$ 843		$ 633		$ 635	
Containers	513		460		900	
Hauling	83		133		11	
Other	190		197		450	
Selling	112		130		426	
Total Harv. and Mktg. Costs		$1,741		$1,553		$2,422
Total Costs Per Acre		$3,597		$4,059		$5,032
Net Return Per Acre		$ 767		$ -659		$ -157
Net Return Per Crate		$ 1.36		$-1.27		$ -.21

MICHIGAN STATE UNIVERSITY
CES
COOPERATIVE EXTENSION SERVICE

MSU is an Affirmative Action/Equal Opportunity Institution. Cooperative Extension Service programs are open to all without regard to race, color, national origin, or sex.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gordon E. Guyer, Director, Cooperative Extension Service, Michigan State University, E. Lansing, MI 48824.

This information is for educational purposes only. Reference to commercial products or trade names does not imply endorsement by the Cooperative Extension Service or bias against those not mentioned. This bulletin becomes public property upon publication and may be reprinted verbatim as a separate or within another publication with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company.

O-14647

1P-1M-1:84(New)UP-KMF, $1.00, For Sale Only.