Staff Paper

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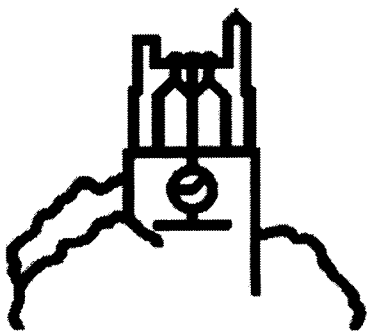

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This bulletin represents a tool that can help producers, consultants, educators, and agribusinesses working with producers estimate costs of production and expected profit based on "typical" tomato management strategies found in Monroe County, Michigan. The budget included in this bulletin will allow users to revise inputs based on their management strategies and calculate their expected cost and profit. This flexibility provides a decision aid to search for systems that generate higher net returns to the farm's resource base.

The brief outline of cultural and pest management practices included in this publication should be supplemented with publications from Michigan State University or from other Universities. See the References section for resources. Many are available on-line.

Processing Tomato Production

In Michigan, most processing tomatoes are grown in Monroe, Lenawee and Saint Joseph counties. Tomatoes are a warm season crop and grow best when temperatures are between 60°F and 90°F. Processing tomatoes are typically grown as transplants and transplanted during mid May, after any possibility of a frost. Tomatoes do not thrive when temperatures are below 55°F and are easily damaged by frost. Nearly all processing tomatoes produced in Michigan are grown on contract.

Site Selection & Planting

Tomatoes thrive in well-drained soil with a pH between 6.5 and 6.8. When selecting which tomato variety to use, consider intended use and soil conditions. Contractors generally specify which varieties can be grown. Transplants should be started 25 – 30 days prior to transplant date and then hardened off by slightly decreasing temperature and water a week prior to transplanting. At transplanting time, the lower part of the stem should be slightly purple and the plant should be green. Transplant tomatoes after soil has reached 60°F. Soil should be amended with adequate fertilizer or manure. A soil test should be conducted to prevent over-fertilization. Some fertilizer is applied prior to transplantation and some after. Recommended sources of nitrogen include calcium nitrate or other fertilizer that supplies nitrogen in a nitrate form. Manure can also be used as a source of nitrogen.

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Pest Management

When seeking advice on use of labeled pesticides (including herbicides), please refer to the most current versions of Michigan State University Extension Bulletins titled "Insect, Disease and Nematode Control for Commercial Vegetables" (Extension Bulletin E-312) and "Weed Control Guide for Vegetable Crops" (Extension Bulletin E-433). They are available on-line at http://www.msue.msu.edu/vegetable/Resources/E312/E312.htm and http://www.msue.msu.edu/vegetable/Resources/weeds/weed.htm *respectively. Specific herbicide and pesticide names have been used in this publication to facilitate accurate budgeting, but Michigan State University does not endorse any of the brand name products listed and does not direct producers to limit management systems to these products.*

Crops that are suggested to precede tomatoes include corn, alfalfa and soybeans. Vegetable crops should not precede tomatoes since they can harbor tomato disease. Tomatoes belong to the nightshade family (*Solanaceae*), which includes potatoes, eggplant, and peppers. Growing non-solanaceous crops for three years prior to tomatoes is usually recommended to avoid pest problems common to this group of vegetables. A subscription to the MSU Vegetable Crop Advisory Alert would provide a good pest management reference. It is available as a mail subscription or over the internet at http://www.msue.msu.edu/ipm/vegCAT.htm

Weed control is crucial to obtain optimum yields and to reduce the incidence of insect and plant diseases. Black night-shade is a host to Colorado potato beetle and a range of tomato diseases such as bacterial spot, bacterial speck, bacterial canker, early blight and white mold. Apply herbicides before and after planting and as needed later to control weeds. A light cultivation may be needed prior to tomato flowering. To reduce occurrence of resistance, rotation of herbicide is recommended.

Insect pest damage to the crop can be greatly reduced through field scouting. Insects that may be a problem may include the corn earworm, the European corn borer, variegated cutworm, Colorado potato beetle, potato aphid, potato flea beetle and stinkbug. See MSU Bulletin E-971 for management recommendations.

Diseases. Several severe diseases can infect tomatoes, however, their occurrence can be greatly reduced by implementing effective sanitation and monitoring programs. There are several important diseases of tomato in Michigan including bacterial spot, bacterial speck, bacterial canker, early blight, late blight, septoria blight, damping off, anthracnose and wilts. Parasitic nematodes such as root-knot and root-lesion nematodes can infect tomatoes and cause a reduction in yield. Practices recommended to control these diseases include use of treated seeds, selection of disease-free transplants and transplantation into healthy soils. Tom-cast is an effective disease predictor that should be employed to help time sprays for disease control. Crop and weed residue should be disked into the soil following harvest to prevent them from serving as hosts for diseases.

Harvest & Handling

Michigan processing tomatoes are typically grown under contract for a processing plant. Harvest starts in mid August and continues through mid-October. The average expected harvest is 30 tons per acre. Most processing tomatoes are harvested mechanically. Seven to 10 workers assist

in the operation as pickers and sorters. The contracting firm often indicates harvest and transport procedures. Tomatoes are usually harvested directly into grower owned trailer-tubs. They may be harvested into carts to open a field or if the field is too wet to permit trailer traffic. Tomatoes are then transported directly to the processing plant where they are checked for quality. The percentage of peelers, color and grade of each load determine the load's price.

Cost of Production Budget
The budget developed using information gathered from growers is presented in Table 1. Details of some practices are mentioned in footnotes. To adapt this budget, insert or remove individual practices as necessary.

Because expected prices and yields vary across years and producers, no revenue was included in this budget. However, Table 2 shows expected net returns at a variety of typical prices and yields. Where indicated in the budget, the cost structure does vary by yield. Use of this table should help producers compare expected returns from typical prices and yields using practices outlined above and detailed in the budget. ***If the budget is modified to better fit a different production system, Table 2 will not accurately represent net returns per acre.***

Approach
The information on tomato cost structure and yields was developed using a focus group of growers with a good knowledge of the industry and good field, enterprise, and financial records. The process was initiated by defining a tomato production system and strategic planning context representative of Monroe County, Michigan. Subsequently, both the sequence of decisions and the information necessary to make these key decisions were collected. This process resulted in a list of inputs and input prices that were then translated into costs, which were verified against grower records.

Because the production system and details were derived from grower input, fertilizer and chemical use may not match some horticultural recommendations. All grower practices were verified and do reflect current procedures. The following budget reproduces, as completely as possible, all costs incurred by these growers.

Pricing Annual Costs of Capital Services (Buildings, Machinery, and Equipment)
Estimating the annual cost of using buildings, machinery, equipment and other assets is a challenge in cost of production studies. In previous studies of Michigan horticultural crops, focus groups constructed a representative farm with fixed acreage and then constructed the buildings, machinery, and equipment needed to operate this farm. They also generated associated labor needs and repair and operating costs. This approach has the advantage of being very tangible but also makes it difficult to interpret results for alternative farm sizes.

In this study, an alternative approach was taken. Buildings, machinery and services were priced to the enterprise on a "custom" basis. Further, services such as land preparation were priced to the enterprise as a "bundled" service/task reflecting both the machinery and labor components of the service.

This approach requires some judgment because costs such as buildings to house machinery and

equipment, the farm shop, and labor used in maintenance of machinery and equipment must be included in the "custom fee" as well as the "depreciation and interest" on the machinery and equipment. The fact that this custom fee approach was used does not imply that custom operators did all the tasks. It simply means the tasks are priced to the enterprise as if a custom operator had completed them. The services may well have been provided by the "machinery services enterprise" of the farm. As a double check, members of the focus group attempted to compare the aggregate custom fee costs to those based on their accounting records which included labor, custom fees, and depreciation and interest on buildings, machinery, and equipment. Custom fees were also double-checked against survey information when available.

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Table 1. Processing tomato budget. Michigan, 2002.

Tomatoes, Processing Bedded and Irrigated					
	Quantity	**Unit**	**Price per Unit**	**Cost per Acre**	**Your Farm**
REVENUE SOURCES					
Tomatoes[1]	30	ton	$ -	$ -	
TOTAL REVENUE				**$ -**	
EXPENSES					
Soil preparation[2]				$ 44	
Plants	13	1000	$ 23.00	$ 299	
Transplanting					
Machinery[3]				$ 23	
Labor[4]				$ 100	
Fertilizer					
Nitrogen (preplant)	50	lb	$ 0.25	$ 13	
Nitrogen (postplant)	65	lb	$ 0.20	$ 13	
Phosphorus	150	lb	$ 0.18	$ 27	
Potash	350	lb	$ 0.13	$ 46	
Limestone	0.5	lb	$ 20	$ 10	
Application[5]	4	apps	$ 6	$ 24	
Foliar feeding materials[6]	8	apps	$ 1.25	$ 10	
Herbicide Materials[7]				$ 55	
Insecticide Materials[7]				$ 80	
Fungicide Materials[7]				$ 30	
Spray applications[8]	12	apps	$ 7	$ 84	
Hoeing	0.5	ac	$ 35	$ 18	
Irrigation[9]				$ 75	
Scouting				$ 7	
Harvest					
Harvester investment[10]	30	ton	$ 11	$ 331	
Harvester maintenance	30	ton	$ 1	$ 30	
Harvest Labor				$ 100	
Tubs and Dump Carts				$ 19	
Trucking	30	ton	$ 18	$ 540	
Land rent[11]				$ 200	
Insurance[12]				$ 33	
Interest[13]	7%			$ 31	
Tool shed & repair overhead[14]				$ -	
Marketing, management & supervision[15]				$ 200	
TOTAL EXPENSES				**$ 2,441**	

FOOTNOTES

1	Price based on 75% peelers. Price also varies by color and grade.
2	Includes V-ripping, discing, power-bedder and rye seed.
3	Cost for tractor and transplanter.
4	Includes costs for 10 seasonal laborers for 15 hours per day, management supervision, flat delivery and clean-up, and one person fitting the soil ahead of the transplanter. Assumes transplanting rate of 1 acre per hour.
5	Includes blending, delivery and application cost.
6	Apply nitrogen and some potassium with this method.
7	Refer to Michigan State University Extension bulletin E-312, "2002 Insect, Disease and Nematode Control for Commercial Vegetables" for more detail. Available at http://www.msue.msu.edu/vegetable/Resources/E312/E312.htm
8	Includes applications of foliar nutrients, herbicides, insecticides, fungicides and ripener.
9	Assumes variable expenses only for a hard hose traveler system. There is no charge for water. See "Selecting a Sprinkler Irrigation System" in the Reference section for more details.
10	Assumes a $200,000 harvester that lasts 10 years and covers 85 acres at 30 tons per acre.
11	11 Includes fixed cost of irrigation system.
12	12 Multi peril less hail and property insurance.
13	13 Operating capital assumed to be half of the variable costs (excluding custom charges) for half of the year.
14	14 These costs are included in custom rates.
15	15 Includes cost of marketing, management and supervision time and a vehicle for the manager.

Table 2. Expected processing tomato net income (loss) per acre at selected price and yield combinations.

	Yield, tons				
Price	28	30	32	34	36
$ 72.00	($365)	($281)	($197)	($113)	($29)
$ 74.00	($309)	($221)	($133)	($45)	$43
$ 76.00	($253)	($161)	($69)	$23	$115
$ 78.00	($197)	($101)	($5)	$91	$187
$ 80.00	($141)	($41)	$59	$159	$259
$ 82.00	($85)	$19	$123	$227	$331