

in that area for later production. The high tunnel also provides some assurance to CSA growers that they will have a crop for their pre-paid customers. An Iowa CSA vegetable grower said that one year her high tunnel saved her spring CSA because the early crops in the field failed due to a late, cold, wet spring.

Enterprise Budget

The enterprise budgets included in this publication are intended to be used as examples. They can help vegetable growers **estimate** the costs and returns to produce a crop or crops in their high tunnel. Enterprise budgets for a high tunnel can help growers allocate valuable space, labor, and capital to the most appropriate use. The most appropriate use may be to maximize profits, meet customer needs, or any other goal defined by the grower.

The estimated costs and returns presented in this publication are based on farm data received from five high tunnels on different farms between

Succession planting for extended harvest periods can be accomplished in three ways.

1. After one crop is harvested, another is planted in the same space. For example, a cool-season crop could be followed by a warm-season crop.
2. The same crop is planted at timed intervals so they mature at different times.
3. Varieties of the same crop with different maturity dates are planted at the same time.

Intercropping is when a crop of a fast-maturing crop, such as lettuce, is planted between rows of a slower-maturing crop, such as tomatoes or peppers. The lettuce is harvested before the larger, later maturing crop requires that space.

April and October in a single growing season. The original farm-derived budgets were adjusted slightly to make them more uniform with respect to ownership and fertilizer costs and other inputs and expenses. Because the high tunnels in the study varied in size, the budgets were developed on a per square foot basis. The various planting and cropping systems in a high tunnel, planting seasons, and management strategies used by the growers also resulted in a wide range of profit potential. The examples given show a profit potential if the entire marketable crop is sold. It does not reflect losses incurred due to unsold products. Also all products were sold at the average price listed.

Lastly, as expected, this study found that a moveable high tunnel was able to add available covered production space through the season as compared to fixed tunnels, resulting in increased profitability.

Budget Format and Assumptions

Enterprise budgets vary in format. Some are complex. Others are quite simple. Note that the budgets included in this publication are divided into four sections. The first section indicates the crop or crops budgeted, the size of the high tunnel, the approximate original cost, and the percent of the high tunnel utilized. Four enterprise budgets are illustrated in this publication: one multiple crop budget and three single-crop budgets (bell peppers; thin-skinned, seedless cucumbers; and tomatoes).

The size of the high tunnel for all budgets was 30 ft. x 72 ft. or 2,160 square feet. The approximate original cost does not take into consideration any rebates or cost-share programs. The percent utilization represents the amount of square footage planted and harvested as a percentage of the total square footage of the high tunnel. If multiple crops are planted and harvested within

a single season (March – September) on the same square footage area, it is possible to incur a utilization percentage greater than 100 percent. The 84 percent utilization for the multiple crop budget was close to the average of the five farms. It is assumed that a single-crop enterprise would utilize all available space other than alleyways. For that reason, single crop enterprises were assumed to have a 94 percent utilization.

The second section illustrates the total receipts the high tunnel enterprise provides on a set unit(s). Records should be kept on both sales unit and land unit (square foot) basis. Prices for single-crop budgets are assumed to reflect institutional or larger buyer prices (non-retail). The use of a single crop would indicate a larger supply available over a designated number of weeks. Prices for the multiple-crop budget were more reflective of a retail (direct-to-consumer) price. Yields were estimated based on what occurred on the five farms over an 8 to 12 week harvest period. The length of harvest was dependent upon the crop and variety. Not all crops were grown on all farms.

The third section is the cost of planting and growing the product. These costs are segmented for two reasons. First, these costs are incurred whether a product is sold or not. Once the seed is planted or watering is completed, it is a sunk cost and needs to be covered from some source. The second reason is the time delay between pre-harvest expenses and the time the product is sold. These expenses may have to be covered by loans, savings, or some other source. Estimated transplant and seed needs were based on a transplant price of \$12 per 48 plants. Fertilizer expense was averaged over the five farms and came to \$0.05 per square foot. Miscellaneous supplies were averaged over the five farms. An additional \$50 was charged to the all-tunnel tomato enterprise to reflect additional costs for

stakes and twine. Miscellaneous supplies do not take into account the initial costs of stakes, trellises, header lines, fittings, etc. Rather, they reflect a replacement value for those supplies. Water was charged at \$0.04 per square foot and a water test was \$17. Water estimates do not include any water usage fees charged by rural water companies or others. Irrigation supplies averaged \$50 for the five farms. An additional charge of \$72 was made to cover 6 hours of labor at \$12 per hour to replace and/or fix any of the drip irrigation lines.

The fourth section is the labor component. Labor is divided into five activities: bed preparation, general maintenance (weeding, staking, pruning, etc.), planting, pest management, and harvest. Bed preparation time was less for single-crop enterprises. General maintenance, planting, and harvesting varied by the needs of the crop and were estimated based on what information was available from the five farms and experience. Labor wage rate was assumed to be \$12 per hour. The wage rate does not include employment taxes, insurance, or other employee benefits.

The fifth section relates to the ownership costs. Each producer owns or controls assets that are used to produce the income, such as land, high tunnel, machinery, irrigation equipment, and other items. Ownership costs are an allocation to realize some return for the use of those assets. It is assumed that the high tunnel has an eight-year life span, and the plastic covering has a four-year life span. The total ownership costs are estimated at approximately \$0.46/square foot based on an approximate total high tunnel construction cost of \$7,000 and a plastic cover replacement cost of \$0.21 per square foot of tunnel (\$454 for a 30 ft. x 72 ft. tunnel). Land rental and depreciation on machinery and equipment (tiller, plastic mulch layer, tractor, etc.) are not included.

The last section is the summary of total costs and returns. Total costs include the annual operating expenses (fertilizer, etc.), labor, and ownership. The return over total costs would be total receipts minus total costs. Annual returns can be analyzed as an overall number or by the square foot. Because space is a constraint in a high tunnel (there is only so much room), it makes sense to review annual returns using both units. Annual returns over total costs varied substantially by farm and enterprise. The differences in annual returns were influenced by a variety of factors. First, the annual return over total cost differed substantially by individual crop. Tomatoes, lettuce, herbs, and eggplant resulted in a much higher return than cucumbers (thin-skinned, seedless varieties) and bell peppers (see the multi-crop enterprise budget example). Second, the annual return over total cost varied among producers. Yields received by producers varied based upon experience with certain crops and the varieties chosen. Third, overall profitability of the high tunnel varied substantially by the percent utilization. Overall, the potential annual returns for a high tunnel (excluding marketing costs) based on the findings of the five farms would indicate that a multi-crop or tomato high tunnel enterprise could be approximately \$3.00 per square foot or

\$6,480 for a 2,160 square foot tunnel (30 ft. x 72 ft.). Assuming an initial investment of around \$7,000, this level of return would indicate about a 1-year payback, which is unusual in agriculture.

Limitations

The illustrated budgets are to be used as an indication of what a particular crop could average over time and location. Individual farm results will vary from these numbers based on crop varieties selected, location to markets, and managerial ability, among other considerations. Note the budgets include receipts but not the costs associated with handling and marketing. A Decision Tool with the examples and blank spreadsheets is also available.

Post-harvest handling of high tunnel crops is often done at the same time as field-harvested crops and, thus, the cost cannot accurately be traced. Also, marketing costs vary tremendously based on whether products are distributed through a CSA, wholesaler, or direct through a farmer's market or other outlet. For this reason, they have not been included in the budgets. Marketing costs should, however, be included to determine crop profitability because, in some cases, costs can shift annual returns from a positive to a negative number.

Special thanks to the five farmers who kept detailed production records for this project.

This project was funded by a Specialty Crop Block Grant through the Iowa Department of Agriculture and Land Stewardship and, in part, by the Leopold Center for Sustainable Agriculture.

. . . and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and July 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

Iowa Multiple Product Vegetable Farm Budget Example

High Tunnel Size (sq. ft.) (30 x 72)	2,160 ft.
Utilization	84%
Approximate Original High Tunnel Cost	\$7,000.00

Receipts	Yield	Sq. Ft.	\$/Lb.	Total	Yield Per Sq. Ft.	Gross Per Sq. Ft.
Cucumbers	567.0	454	\$2.00	\$1,134.00	1.25	\$2.50
Eggplant	204.1	45	2.00	408.24	4.50	\$9.00
Greens	166.9	363	7.00	1,168.47	0.46	\$3.22
Herbs	14.5	9	16.00	232.24	1.60	\$25.60
Lettuce	208.7	181	7.00	1,460.59	1.15	\$8.05
Peppers - Bell	290.3	181	2.00	580.61	1.60	\$3.20
Tomatoes - Slicers	1,315.4	454	2.50	3,288.60	2.90	\$7.25
Tomatoes - Grape	342.9	127	4.00	1,371.69	2.70	\$10.80
Total Receipts		1,814		\$9,644.44		\$5.32

Annual Expenses	Total
Seeds/Transplants	135.00
Fertilizers	108.00
Miscellaneous Supplies	125.00
Water	86.40
Water Test	17.00
Irrigation Supplies	122.00
Total Annual Expenses	\$593.40

March - September

Labor Costs	Hours	\$/Unit	Total
Bed Preparation	17.00	12.00	\$204.00
General Maintenance	23.00	12.00	\$276.00
Planting	10.50	12.00	\$126.00
Pest Management	0.00	12.00	\$0.00
Harvest	48.80	12.00	\$585.60
Total Hours	99.30		\$1,191.60

Ownership Costs	Annual
Depreciation - Tunnel	\$875.00
Depreciation - Plastic Cover	113.40
Total Ownership	\$988.40

Total Costs	
Tunnel	\$2,773.40
Per Square Foot	\$1.28
Annual Returns Over Total Costs	
Tunnel	\$6,871.04
Per Square Foot	\$3.18

Iowa Vegetable Farm - Bell Pepper Budget Example

High Tunnel Size (sq. ft.) (30 x 72)	2,160 ft.
Utilization	94%
Approximate Original High Tunnel Cost	\$7,000.00

Receipts	Yield	Sq. Ft.	\$/lb	Total
Peppers - Bell (520 plants)	3,248.6	2030	1.30	4,223.23
Total Receipts				\$4,223.23

Annual Expenses	Total
Seeds/Transplants	175.00
Fertilizers	108.00
Miscellaneous Supplies	125.00
Water	86.40
Water Test	17.00
Irrigation Supplies	122.00
Total Annual Expenses	\$633.40

March - September

Labor Costs	Hours	\$/Unit	Total
Bed Preparation	10.00	12.00	\$120.00
General Maintenance	10.00	12.00	\$120.00
Planting	9.00	12.00	\$108.00
Pest Management	0.00	12.00	\$0.00
Harvest	30.00	12.00	\$360.00
Total Hours	59.00		\$708.00

Ownership Costs	Annual
Depreciation - Tunnel	\$875.00
Depreciation - Plastic Cover	113.40
Total Ownership	\$988.40

Total Costs	
Tunnel	\$2,329.80
Per Square Foot	\$1.08
Annual Returns Over Total Costs	
Tunnel	\$1,893.43
Per Square Foot	\$0.88

Iowa Vegetable Farm - Cucumber Budget Example

High Tunnel Size (sq. ft.) (30 x 72)	2,160 ft.
Utilization	94%
Approximate Original High Tunnel Cost	\$7,000.00

Receipts	Yield	Sq. Ft.	\$/lb	Total
Cucumbers (390 plants)	2,538.0	2030	1.25	3,172.50
Total Receipts				\$3,172.50

Annual Expenses	Total
Seeds/Transplants	70.00
Fertilizers	108.00
Miscellaneous Supplies	125.00
Water	86.40
Water Test	17.00
Irrigation Supplies	122.00
Total Annual Expenses	\$528.40

March - September

Labor Costs	Hours	\$/Unit	Total
Bed Preparation	10.00	12.00	\$120.00
General Maintenance	15.00	12.00	\$180.00
Planting	5.00	12.00	\$60.00
Pest Management	0.00	12.00	\$0.00
Harvest	40.00	12.00	\$480.00
Total Hours	70.00		\$840.00

Ownership Costs	Annual
Depreciation - Tunnel	\$875.00
Depreciation - Plastic Cover	113.40
Total Ownership	\$988.40

Total Costs	
Tunnel	\$2,356.80
Per Square Foot	\$1.09
Annual Returns Over Total Costs	
Tunnel	\$815.70
Per Square Foot	\$0.38

Iowa Vegetable Farm - Tomato Budget Example

High Tunnel Size (sq. ft.) (30 x 72)	2,160 ft.
Utilization	94%
Approximate Original High Tunnel Cost	\$7,000.00

Receipts	Yield	Sq. Ft.	\$/lb	Total
Tomatoes - Slicers (195 plants)	5888.2	2030	1.60	9,421.06
Total Receipts				\$9,421.06

Annual Expenses	Total
Seeds/Transplants	80.00
Fertilizers	108.00
Miscellaneous Supplies	175.00
Water	86.40
Water Test	17.00
Irrigation Supplies	122.00
Total Annual Expenses	\$588.40

March - September

Labor Costs	Hours	\$/Unit	Total
Bed Preparation	10.00	12.00	\$120.00
General Maintenance	25.00	12.00	\$300.00
Planting	5.00	12.00	\$60.00
Pest Management	0.00	12.00	\$0.00
Harvest	49.00	12.00	\$588.00
Total Hours	89.00		\$1,068.00

Ownership Costs	Annual
Depreciation - Tunnel	\$875.00
Depreciation - Plastic Cover	113.40
Total Ownership	\$988.40

Total Costs	
Tunnel	\$2,644.80
Per Square Foot	\$1.22
Annual Returns Over Total Costs	
Tunnel	\$6,776.26
Per Square Foot	\$3.14