

Final Report

Understanding the Economics of Hoophouse Crops in Northern Climates

GNC13-171

Submitted by Dr. Bridget K. Behe for Ms. Laura Haselhuhn

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Summary: An increasing trend among North Central Region farmers is the use of unheated greenhouses, commonly referred to as hoophouses or high tunnels, to extend the growing season and produce food crops when ambient outdoor growing conditions would not permit it. Hoophouses are low cost plastic covered structures that can help farmers gain a competitive edge through growing and selling a wider variety of vegetables year-round. A review of hoophouse related literature reveals that while a many resources exist to assist farmers with construction and production, minimal research has been done to investigate the on-farm profitability of specific hoophouse crops. This lack of research has profoundly limited the success of farmers choosing to use season extension technology.

The proposed project seeks to address this gap in research in two ways. First, we will run a pilot program with eight hoophouse farmers throughout the region to develop benchmarks for crop profitability. These farmers will track and keep records of the crops grown in their hoophouses for two seasons, spring and summer. The results from these farmers will be compiled to show the on-farm results of hoophouse crop profitability for specific hoophouse crops. These results will be published in an extension bulletin for other farmers to use as benchmarks for their own farms. Secondly, a spreadsheet tool currently in use for commercial greenhouse production will be adapted for hoophouse farmers to calculate the profitability of hoophouse vegetable crops. Both resources will be posted online and introduced at a conference attended by an estimated 200 farmers. Farmers in the pilot program will be surveyed to gauge their learning as a result of participating in this project. Attendees at the conference will also be surveyed to assess the benefit of this research.

In the short term the pilot results and spreadsheet tool will enable farmers to focus their production plans on profitable crops, provide benchmarks to compare results with and provide a tool for farmers to record their data. Through understanding the profit/loss results for each hoophouse crop, farmers will be able to adjust their production plans and pricing to increase the likelihood of profitability in future seasons. In the long run, hoophouse farmers throughout the region will see increased profitability from their hoophouse enterprises, which will increase the financial viability and sustainability of farms throughout the region.

Objectives/Performance Targets

The outputs of the project are designed to maximize the impact and value of this project's results throughout the North Central Region. First, a spreadsheet tool for calculating crop profitability will be adapted for hoophouse use and made available to farmers. This tool will provide a way

for farmers to calculate the profitability of their own hoophouse crops. The eight farmers from the pilot project will offer input in the spreadsheet tool design and will be also trained in the use of the spreadsheet tool.

Next, in order to reach a larger sector of the farming community, the results from the eight farmer pilot program will be published in an extension bulletin. In addition, a conference presentation will be made to introduce the results and spreadsheet tool to an estimated audience of 200 farmers. To further expand the audience for this research and spreadsheet tool, the pilot project results and spreadsheet will be posted on the MSU Hoophouse website. Finally, a larger project will be designed in order to expand the data set, reach and impact of this pilot project.

Materials and Methods:

We obtained IRB approval for our protocol and instruments (IRB #14-098e). We then recruited 9 farms in the lower peninsula of MI and asked them to provide forms and keep spreadsheets for their record keeping. We provided cash incentives for farmers to submit monthly data. They tracked carrots, peppers, and tomatoes. The graduate student left the program half way through data collection. Adam Montri and Dr. Bridget Behe completed as much data collection and analysis as possible.

Results and Conclusions:

Few farmers were account for depreciation. Detailed records on small, diversified farms can be a challenge.

MSU Hoophouse Economic Study



Adam Montri
MSU Department of Horticulture

Michigan Hoophouse Use History

- >15 Years: Overwintered nursery stock
- 10-15 Years: Warm season crop extension
- 10 Years: "How-to" years, construction, crop selection, fertility and irrigation, early winter production
- 5 Years: Year-round farming, optimizing systems, some economics
- Last 3 Years: More farmers, more production, more year-round markets and marketing, increased product demand, *more experienced hoophouse farmers*

NC-SARE Funded Graduate Student Project Asked:

- Are farmers making \$ in their hoophouses?
- How are they determining pricing?
- Are they tracking costs of production?
- How and where are they marketing?

Materials and Methods

- 9 farms in the Lower Peninsula
- Provided forms and spreadsheets for record keeping
- Provided cash incentives for farmers to submit monthly data
- Tracked carrots, peppers, and tomatoes

Start-Up Forms for Depreciation

Instructions: Once your hoophouse is completely built and ready for planting, fill out this form to total the start-up costs:

Total hoophouse quote cost (less cost of poly):

Total for shipping:

Additional Supplies/Materials (e.g. extra hardware, etc):

Costs for electrical:

Costs for running water out to house:

Construction Labor:

Payroll Taxes for Construction Labor:

Interior Cover:

Materials to set up Interior cover:

Drip Irrigation:

Other:

Total expenses for setting up hoophouse for production

Total expenses for setting up hoophouse for production[illegible]

- \$15,000 initial investment with 2000 ft² of production and 5 year payback goal
- = \$1.50/ft²/year or \$0.004/ft²/day
- ~ 180 days for tomatoes
- \$0.004 X 180 days = \$0.72/ft²
- X 2000ft² = \$1,440

Crop Tracking

Crop Plan _____ Month: _____

General Hoophouse Information:						
Hoophouse size: _____						
Size of beds in house (sq ft or dimensions): _____						
Total Number of beds in house: _____						

House #	Bed #s	Plant Date	Crop	Variety	Total square feet planted	Removal Date
Example	1-10	1/30/12	Spinach	Tyee	1000	3/21/12

[illegible]

Labor Tracking – On-Farm

Monthly Labor Tracker

Hoophouse Labor for: _____
(month)

Farm Name: _____

Instructions: Track all crop specific labor in min/hours, use additional sheets if needed

Examples of Crop Specific Activities:

Bed Prep	Weeding	Harvest
Transplanting	Washing/Packing	Weeding
Seeding	Pest Control	Other:

Date:	Crop:	Bed Number(s):	Activity:	Time (to the 15 minute):	Paid labor/unpaid (e.g. yourself)
EXAMPLE	Swiss Chard	12	weeding	15 minutes	paid @ \$8/hr
EXAMPLE	Spinach-Tyee	3-13	harvest	1.25 hours	unpaid

Labor Tracking – Off-Farm

Date:	Activity:	Description	Time (to the 15 minute):	Paid labor or unpaid (e.g. yourself)?
EXAMPLE	Market	selling at farmers market	5.75 hours	paid @ \$8/hr
EXAMPLE	Driving	driving time for market	2 hours roundtrip	paid @ \$8/hr
EXAMPLE	Recordkeeping	counting inventory prior to mkt	15 minutes	myself

Yields, Area and Time

Crop Enterprise Budget:

Tomato

Harvested yield (lbs)	6782.00
Sold yield (lbs)	4458.46
Number of Plants	400.00
Square footage	1656.00
Days in Hoophouse	292.00

Profitability

	With no depreciation cost:	20 year depreciation model:	5 year depreciation model:
Revenue	\$15,826.00	\$15,826.00	\$15,826.00
Costs:			
Direct Materials	\$100.00	\$100.00	\$100.00
Direct Labor*	\$126.25	\$126.25	\$126.25
Overhead	\$20.15	\$20.15	\$20.15
Overhead Labor*	see below	see below	see below
Depreciation of Hoophouse	n/a	\$224.84	\$899.35
Depreciation of Poly	n/a	\$171.52	\$171.52
Selling costs	\$1,323.67	\$1,323.67	\$1,323.67
Net Income	\$14,255.93	\$13,859.58	\$13,185.06

Profit and Labor

Profit/ Square Foot	\$8.61	\$8.37	\$7.96
Profit / Square Foot / Day in Bed	\$0.0295	\$0.0287	\$0.0273

***Farmer wages:**

Unpaid Direct Hours	62.92	62.92	62.92
Unpaid Overhead & Selling Hours	412.29	412.29	412.29
Total Unpaid Hours	475.20	475.20	475.20
Return to Labor	\$30.00	\$29.17	\$27.75

Managing Labor

- $\$13,185 / 475 \text{ hours} = \27.75
- $475 \text{ hours} / 2 = 237.5 \text{ hours}$
- $237.50 \text{ hours} \times \$12.50 = \$2,970$
- $\$13,185 - \$2,970 = \$10,215$
– (plus 237.5 more hours for the farmer)

Take Home Lessons

- Few are accounting for depreciation
- Detailed records on small, diversified veg farm can be a challenge
- Start with 1 or 2 crops
- Markets need to match scale of production
- Winter crops need a market

Resources and Forms

- www.hoophouse.msu.edu
- <Resources> tab



Thanks! Questions?